Food and Agriculture Organization of the United Nations

Enhancing the sustainability and financing of forest-based value chains

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Enhancing the sustainability and financing of forest-based value chains

by

Marco Boscolo,
Petri Lehtonen,
Erica Di Girolami and
Giang Duong

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Brazil - Sustainable tree plantation surrounded by natural forest.

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Majestic tree from below.

Philippines - Forested landscape in Bohol.

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CHAPTER 1

Introduction

1. INTRODUCTION

One of the challenges of this generation is to promote better and more sustainable ways of producing and consuming. Ensuring sustainable consumption and production is also a Sustainable Development Goal (SDG 12). As illustrated by a recent World Wide Fund for Nature (WWF) study (Beck-O'Brien *et al.*, 2022), improving production is not enough to achieve the climate targets set out in the Paris Agreement. How we consume, reduce waste and promote recycling, re-use, cascading uses and circularity are also important. Adopting a value chain approach can help identify solutions that bridge sectors and connect consumption with production[1] (FAO and UNIDO, 2024; Kaplinsky and Morris, 2001).

Analyses of value chains explore the interconnectedness among actors, support providers and the environment in which they operate, their complex interlinked behaviours, and their technical, economic, social and environmental performance. They help devise upgrading interventions that will improve the competitiveness and sustainability of the chain.

Such analyses have proven to be an important tool to trace how products reach end markets, which actors critically influence the functioning of the value chain, and how financial margins are shared among the chain actors, and to study power relations in value chain governance structures (van Dijk and Trienekens, 2012; Gereffi, 1999; Kaplinsky and Morris, 2001; Ribot, 1998).

They can be used to trace how the decisions, actions and attitudes of actors along the chain impact, and can be impacted by, the sourcing landscapes (Ha, Benedikter and Kapp, 2022). For example, investments in forest assets are less attractive if the market for raw material is limited or does not pay well. This may occur because of export restrictions or bans, or because raw material is purchased by processing facilities that are inefficient (with low paying capacity for wood) or acting as monopolies (price setters). Conversely, investments in processing facilities will not occur in the absence of a sufficient and reliable source of raw material and an attractive market for processed products. Therefore, strengthening value chains must involve careful balancing of production, transformation and consumption.

Increasingly, the design and implementation of forestry interventions, including those focusing on conservation, restoration or the sustainable production of forest products, rely on a thorough understanding of how a value chain is structured, functioning and performing. Restoration and conservation projects now routinely incorporate elements of value chain development (such as market and enterprise development) in their plans to create opportunities for alternative livelihoods, jobs and higher incomes for local farmers and communities.[2] Interventions to improve

[1] Point made at a Brussels briefing on "Strengthening the forest-based bioeconomy – A contribution to a more sustainable future with forests" held on 7 June 2023.

[2] See, for example, Sacande and Parfondry (2018) and World Bank (2014).

the sustainability[3] of value chains can also drive improvements in the management of forests and natural resources, leading to improved environmental outcomes. More robust value chain analyses constitute an essential starting point for developing and upgrading interventions.

Value chain upgrading interventions are defined in this report as improvements in value chain efficiency, competitiveness, sustainability and resilience. They can also help shift from lower-value economic activities to higher value ones using local innovation and enhanced capabilities to improve processes, products and functions. In some cases, upgrading may involve the use (diversification) of new raw material sources (new producers are integrated in the value chain), the adoption of new technologies, the development of new products (including product differentiation in the market) or access to new markets. Using value chain analyses to identify upgrading interventions allows to adopt a systems perspective, by focusing on the behaviour and performance of value chain actors operating in a complex environment.

Value chain analyses that are well done can also play a critical role in stimulating better investments. They can inform, direct and facilitate investments that are profitable, contribute to a more fair and sustainable bioeconomy, and complement climate, biodiversity and restoration finance.

1.1 DOCUMENT RATIONALE AND OBJECTIVES

Multiple operational guides exist on how to assess and upgrade agricultural value chains (see Section 2 and the Appendix). These guides have also been used to assess forest-based value chains. However, the guidance they provide is inadequate for assessing the specificities of forest-based value chains, which include forest multifunctionality and the role of ecosystem services provided by forests, the public good or common property nature of many forest assets, and the long production cycles.

Furthermore, existing guides and literature pay limited attention to the role of finance. This is surprising since one of the advantages of linking production, restoration and conservation activities to value chain development is to mobilize additional finance, and private finance in particular, in support of these objectives.[4] For projects funded by public resources (e.g. national budgets or multilateral funds like the Global Environment Facility (GEF) and the Green Climate Fund (GCF)), the engagement of private operators opens the possibility of co-financing and credible exit-strategies, which makes projects more attractive to resource partners.

[3] Sustainability refers to the triple-bottom line, requiring the maintaining or improvement of economic, social and environmental outcomes. Sustainability also encompasses the value chain's resilience to shocks (FAO, 2021a; FAO and UNIDO, 2024).

[4] A recent review (Vivid Economics, 2021) estimates that only 13 percent of investments in nature-based solutions (including conservation and protection of forests) came from private sources. More private finance needs to be mobilized, and a better understanding of value chains is fundamental to motivating more private sector engagement and finance.

By accounting for forest specificities and the role of finance in value chains, this document aims to fill the gaps in existing guides and improve capacities to mobilize additional finance, and private finance in particular, in support of forest production, restoration and conservation objectives.

This publication is part of the FAO series of practitioner handbooks on sustainable value chain development following systems thinking. The theoretical framework that underpins the whole series is the sustainable food value chain (SFVC) framework, as presented in FAO (2014) – the first handbook in the series, and further elaborated in the SFVC methodological brief (i.e. FAO and UNIDO, 2024). Based on this conceptual foundation, other handbooks in the series aim to provide practical guidance on specific aspects of sustainable value chain development (such as value chain selection, gender-sensitive value chains, youth-sensitive value chains and agro-input market systems) in commodity-specific contexts (such as forest value chains – the focus of this publication), and fisheries value chains (Neven *et al.*, 2025) . This publication, therefore, builds on the SFVC methodology while also drawing on other existing methodologies and incorporating specific adjustments to adapt the generic SFVC methodology to the forestry context. Specifically, the publication provides guidance on how to carry out forest-based value chain assessments, how to choose and design upgrading interventions, and how to finance them.

The document:

a) Incorporates the specificities of forest-based value chains and identifies what makes them different from agricultural value chains.[5]

b) Provides the target users with a holistic method, which investigates actors, the context in which they operate, their interlinked behaviours, and their technical, economic, social and environmental performance.

c) Assesses available and potential providers of financial services and the instruments that they use, and identifies modalities for upgrading forest-based value chains to address key finance needs.

d) References some existing tools developed for other agrifood value chains, some of which need to be adapted or refined to assess forest-based value chains. FAO is currently developing specific tools for forest-based value chain assessments together with tools to guide the collection and analysis of the indicators required (e.g. sustainability analysis).

1.2 TARGET USERS

This document was developed to support **project developers**, such as development agencies, civil society organizations, government agencies and producer and industry associations, advancing restoration, conservation and sustainable production and use; **policy decision makers**, such as ministries, forestry agencies and international development agencies; **private sector operators**, such as small and medium-sized

[5] Agricultural value chains are defined in FAO (2021b).

enterprises (SMEs), large companies, investors, traders and other service providers; and **finance sector stakeholders**, such as development finance institutions, funds promoting sustainability and local finance institutions.

Users will learn how to design and carry out a value chain analysis and how to use the results of such an analysis to design and finance an upgrading strategy. Finance sector stakeholders will find this document useful to explore ways in which to build their capacities and portfolios. Local finance stakeholders will identify opportunities to potentially act as intermediaries for international financing.

1.3 HOW TO USE THIS DOCUMENT

This document introduces a set of analyses that help users to think through, organize and develop value chain upgrading interventions. Each analysis provides insights into how a value chain is structured, functioning and performing.

Individually, each analysis will help build a picture of bottlenecks and the root causes of inefficiencies as well as potential leverage points and opportunities to strengthen the value chain. Taken together as a systems approach, they provide a comprehensive view of how value is currently created and distributed and where targeted interventions can address the root causes of underperformance and improve sustainability, competitiveness, inclusion and resilience. It is important to note that systemic disruptions (positive or negative) can be activated by changes taking place within the value chain or outside of it (e.g. social, technological, economic, environmental changes).

Using a systems approach is effective for recognizing interconnectedness among actors, stages and components of the value chain. It can also reveal both positive and negative feedback loops within the system and catalyse stakeholder collaboration, participation and dialogue. It provides a relatively complete, big picture of the value chain.

In practice, comprehensive value chain analyses are complex and expensive, and may appeal to only a limited set of market actors. More often, due to specific contexts and the priorities of donors and governments, or because of time, resource or capability constraints, users may choose to emphasize specific aspects of the value chain functioning and performance. In these situations, a comprehensive analysis is still performed, but analysts may prioritize certain areas of the value chain for detailed examination. For example, the primary purpose of the analysis might be to:

- Improve livelihoods by reducing dependence on unsustainable practices and making sustainable practices more economically rewarding than unsustainable ones. In this case, analyses may focus on identifying the constraints that prevent actors from adopting sustainable practices, and developing solutions to address these constraints, which may be through the identification of profitable business opportunities linked to the adoption of sustainable practices (such as adding value to raw unprocessed products), facilitation of access to better paying markets, and facilitation of access to the inputs and services required for the adoption of improved practices.

- Increase green jobs, promote sustainable agrifood systems and support countries in their transition to a sustainable bioeconomy. When this is the primary purpose of the analysis, of special interest is the identification of key constraints, leverage points, investment needs and new business models that can advance competitiveness, inclusion, sustainability and resilience.
- Select and invest in "green" businesses that have the potential to be scaled up. When this is the primary purpose of the analysis, of special interest is the identification of business models that have high potential for generating "green" jobs and income and for scaling up. The analyses may focus on assessing the market potential, commercial and technical viability and long-term sustainability of these business models.
- Promote conservation and restoration (where business activities can be carried out in ways that promote conservation and restoration). When this is the primary purpose of the analysis, of special interest is the identification of enterprises and business models that from the outset are designed to conserve and restore ecosystems and increase the value of forests.
- Manage and reduce risks and enhance the resilience of the value chain. When this is the primary purpose of the analysis, of special interest is the identification of risks, the assessment of the chain's vulnerability to disruptions, and the structural or functional improvements that can improve resilience.
- Understand the potential impacts of structural changes (e.g. new infrastructure), the introduction of new technologies (e.g. digitalization of processes, manufacturing or marketing) or new products (e.g. mass timber).

Regardless of the specific purpose, a participatory process with key value chain stakeholders is essential to define the focus of analysis so that key priorities, goals and concerns are fully taken into account. This definition of focus further implies that in practice, when conducting a value chain study, practitioners may focus on analysing in-depth only those specific aspects of the value chain and its sustainability performance that are deemed most critical to, or have the most strategic relevance for, the focus of the study. Meanwhile, other aspects of the value chain might be covered in a much lighter way, if included at all.

Bearing in mind the need to adjust the analysis – both in terms of the topics to cover and its analytical depth – according to the focus of the analysis, this publication aims to provide practitioners with an overview of what a full value chain analysis should include (i.e. which assessments should be included in the analysis, and for each assessment, how it can be carried out). This guide, hence, should be understood and used as a general guide for the conduct of forest value chain assessments, which practitioners can use as a "checklist" to guide their analysis to ensure that they follow a systems approach and do not miss out on any important aspects that should be considered. Meanwhile, there remains a need to customize this general "checklist" (e.g. removing or adding some assessments, adjusting the level of analytical depth of specific assessments) according to specific value chain contexts and purposes.

1.4 DOCUMENT STRUCTURE

Following this introductory section, the document is organized as follows:

Section 2 offers a definition of forest-based value chains and describes the attributes that distinguish them from other agrifood value chains.

Section 3 and Section 4 present nine assessment areas that look at how the value chain currently operates: the productive assets, the value chain mapping, the end-market analysis, the analysis of value chain actors, the governance analysis, the assessment of economic, social and environmental sustainability, and an assessment of the resilience of the value chain. Each analysis is briefly described and enriched with a forest-based example. This section concludes with a practical suggestion for presenting the outcomes of the value chain assessments.

Section 5 builds on the outcomes of Sections 3 and 4 and suggests an approach to design value chain upgrading interventions. This part of the work can only be successfully achieved with significant engagement and participation from relevant stakeholders. An outcome of this participatory process is the design of upgrading interventions and plans that improve (or at least do not worsen) performance for all value chain actors. To support the participatory process, FAO and UNIDO (2024) foresee three multistakeholder workshops to promote engagement and dialogue: (1) inception of the work; (2) analysis validation and vision development; and (3) validation of the value chain development plan.

Section 6 describes persistent challenges in financing forest-based value chains and reviews possible ways to address them: what sources and instruments are available to finance value chain upgrading interventions. This step requires the development of **innovative and creative solutions** that can help solve, or at least alleviate, many challenges that constrain access to finance, and catalyse investments in the value chain.

Key takeaway messages

- We need to change how we produce and consume to achieve sustainability goals. The sustainability of production and consumption can be improved by identifying ways to improve value chains.
- Value chains include the entire journey of a product, from production to consumption (including disposal after use), the actors involved, how they are interconnected, and the broader systems they operate in.
- Value chain analyses help understand how the "system" is working and why. They can complement alternative approaches (such as enterprise development interventions or modelling analyses) to help identify opportunities and leverage points (critical stages) to improve efficiency, competitiveness, inclusion, market access and environmental impact.
- Investments in processing facilities and market development can incentivize sustainable forest management practices.
- Sustainable value chains benefit the economy, society and the natural environment.
- Value chain analyses can help attract investments that are profitable and sustainable while contributing to environmental goals.

Viet Nam - A worker watering young tree seedlings in a sustainable Acacia tree nursery.

© FAO/Joan Manuel Baltellas

CHAPTER 2

What are forest-based value chains?

2. WHAT ARE FOREST-BASED VALUE CHAINS?

A value chain encompasses all actors from production to consumption and their coordinated value-adding activities, which transform raw materials into products for final consumption or use, and waste disposal (Baleta and Pegram, 2014). In a circular bioeconomy, final products can become inputs for further processing or cascading use, thereby extending their life cycle and improving resource efficiency.

Value chains are dynamic, market-driven systems in which horizontal and vertical coordination are the central dimensions and for which value addition and sustainability are explicit, multidimensional performance measures, as per the definition adapted from FAO (2014).

Forest-based value chains include both wood and non-wood forest products (NWFPs). Products obtained from activities such as forest management, wood processing and the manufacturing of intermediate and final products, as well as paper and paperboard products and furnishings (Gravelsins *et al.*, 2017; Lebedys and Li, 2014) have direct implications for sustainability and local development. Once processed, forest products become inputs into multiple value chains in a wide range of other sectors, such as food, electric power generation, transmission and distribution, construction of buildings, the manufacture of basic metals, furniture and packaged consumer goods, and publishing activities (see Figure 1). Some products go through multiple stages of processing (e.g. engineered wood products), while others are consumed with limited processing (e.g. honey).

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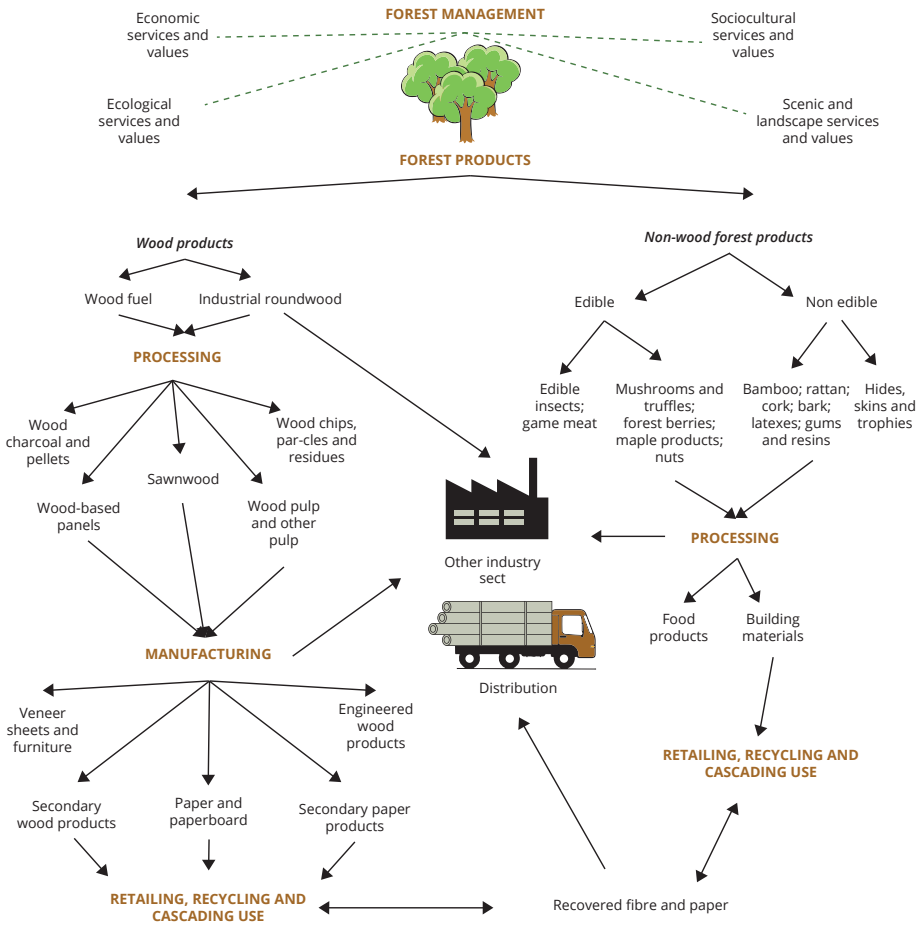
Brazil - Expansive tree plantation integrated with preserved forest patches.

FIGURE 1

Examples of products and stages of forest-based value chains



Source: Based on FAO. 2022. *Classification of forest products 2022.* Rome. https://doi.org/10.4060/cb8216en and adapted from Neeff, T. 2018. Understanding the Sustainability of Forest Value Chains. Draft.

Forest value chains differ from other agrifood value chains in several fundamental aspects. Key among them is that forests provide crucial public goods that contribute to societal well-being without generating direct profit for their owners or managers (FAO, 2022a). Wood production value chains have multiyear production cycles and often include complexities related to managing biodiverse ecosystems. Ownership and tenure are often tenuous, underscoring the importance of government policies, governance and the rule of law in ensuring the functioning of forest value chains and the livelihoods of many people. These and other unique dimensions of forest-based value chains are discussed in Section 2.1.

In conclusion, forest-based value chains are complex systems with far-reaching societal and environmental implications. Recognizing the public good nature of ecosystem services, fostering better financing mechanisms, and ensuring clear and secure land tenure are all crucial aspects for promoting sustainable forest management practices within these value chains.

Frameworks, methodologies and guidelines that already exist to assess agrifood value chains can be useful in the assessment of forest-based value chains but require adaptation (see Box 1).

Box 1

A brief overview of existing guides for agrifood value chains

Multiple frameworks, methodologies and guidelines already exist to assess agrifood value chains.

Common ones include:

- FAO and UNIDO, 2024: Developing sustainable food value chains. SFVC Methodological Brief. https://openknowledge.fao.org/handle/20.500.14283/cc9291en [i]
- FAO, 2014: Developing sustainable food value chains – Guiding principles. https://openknowledge.fao.org/server/api/core/bitstreams/e47d2ad8-5910-435e-a6b4-92dda2367dc7/content [ii]
- GIZ, 2018: Valuelinks 2.0. https://valuelinks.org/material/manual/ValueLinks-Manual-2.0-Vol-1-January-2018.pdf. and https://valuelinks.org/material/manual/ValueLinks-Manual-2.0-Vol-2-January-2018.pdf [iii]

  See also, including cases and applications: https://www.giz.de/en/worldwide/77960.html
- European Commission: Value Chain Analysis for Development (VCA4D): https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d-/documents [iv]
- Australia: https://www.researchgate.net/publication/292831956_A_guide_to_value_chain_analysis_and_development_for_Overseas_Development_Assistance_projects [v]

A brief description of each of these guidance documents is included in the Appendix, along with the recommended templates, software or training material.

These guides are also used to assess forest-based value chains. In these instances, important adaptations and complementary activities are needed to cover specificities typical of forest-based value chains and the role of finance service provision.

Sources:

i FAO & UNIDO. 2024. Developing sustainable food value chains – Practical guidance for systems-based analysis and design. SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

ii FAO. 2014. Developing sustainable food value chains – Guiding principles. Rome. https://openknowledge.fao.org/server/api/core/bitstreams/e47d2ad8-5910-435e-a6b4-92dda2367dc7/content

iii Springer-Heinzer, A. 2018a. ValueLinks 2.0. Manual on Sustainable Value Chain Development. Volume 1. Value Chain Analysis, Strategy and Implementation. GIZ. https://www.valuelinks.org/material/manual/ValueLinks-Manual-2.0-Vol-1-January-2018.pdf

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iv EU. 2017. Value Chain Analysis for Development (VCAD). In: Capacity4dev. [Cited 27 August 2024]. https://capacity4dev.europa.eu/projects/value-chain-analysis-for-development-vca4d/library_en

v Collins, R., Dent, B. & Bonney, L. 2015. A guide to value chain analysis and development for overseas development assistance projects. Canberra, ACIAR. https://www.researchgate.net/publication/292831956_A_guide_to_value_chain_analysis_and_development_for_Overseas_Development_Assistance_projects

2.1 DISTINCTIVE ATTRIBUTES OF FOREST-BASED VALUE CHAINS

Forests provide important public goods in the form of ecosystem services (e.g. climate mitigation, water regulation, and habitats for biodiversity)[6] for which limited and imperfect markets exist. Based on data provided by FAO (2022a), it could be said that most of the value that forests provide to society is in the form of these services.

The existence of important ecosystem services with limited markets has two financial implications. The first implication is that forest operators are at a disadvantage when competing for access to private finance with other actors (e.g. in agriculture). This is because the public goods and positive externalities provided by forests do not show up in the traditional balance sheets and financial statements of enterprises, and because negative externalities, like those created by some agrifood businesses, are usually unaccounted for.[7] In other words, **forest-based enterprises compete for access to finance in an uneven playing field** that does not recognize their contribution to important public goods.

The second implication is that, from a societal viewpoint, the level of finance allocated to forests is suboptimal. The scale of this misallocation of finance is significant. FAO, UNDP and UNEP (2021) estimate that support to agricultural producers accounts for almost USD 540 billion a year, with a large proportion of this being harmful to the environment and to human health. UNEP (2022) estimates that nature-negative financial flows to agriculture, in the form of price incentives and fiscal transfers, reached USD 500 billion in 2022, while finance for nature-based solutions (nature-positive flows) was USD 154 billion.

Several initiatives are underway to identify and redirect those financial flows that contribute to deforestation. For example, the European Union has put in place a transparency framework, the Sustainable Finance Disclosure Regulation in the financial services sector (*Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector,* 2019). The framework sets out how financial market participants must disclose sustainability information enabling sustainability-minded investors to make more informed choices. Increasingly, investors are also recognizing that financial returns alone are insufficient to evaluate the true value and sustainability of a business. In the *Global Risk Report 2024*, the World Economic Forum (2024) ranks environmental risks among the top perceived risks for businesses, both in terms of likelihood as well as impact.

This non-marketable dimension of forest value chains calls for special consideration of environmental factors when carrying out the sustainability assessment (see Section 6.2).

[6] See, for example, Boston Consulting Group (2020), Brander *et al.* (2023) and FAO (2022a).

[7] For example, FAO (2023a) estimates that the hidden costs of agrifood systems amount to USD 10 trillion or more at 2020 purchasing power parity (PPP), with environmental hidden costs making up over 20 percent of the quantified hidden costs, mostly associated with greenhouse gas (GHG) and nitrogen emissions.

Forests are mostly under public ownership or under communal land tenure or management. There has been an increasing trend[8] in the proportion of private actors with rights to manage publicly owned forest, and local, tribal and Indigenous Peoples' communities are legally recognized as owning at least 447 million hectares (ha) of forest (as of 2017, FAO 2022a). Still, FAO (2022a) estimates that about three-quarters (73 percent) of forests globally were publicly owned in 2015, while only 22 percent were privately owned. Furthermore, despite decades of land-titling programmes, property rights remain poorly defined, poorly enforced, or both, in many developing countries.

The implications of these ownership and tenure conditions are manifold. The roles of governments, policies, governance (who makes decisions and how they are made), rule of law, and so forth are of paramount importance in the functioning of forest value chains and the livelihoods of many people. Political instability, policy uncertainty, weak and inconsistent enforcement of the rule of law are among the key factors of forest value chain underperformance and the "risky" nature of forestry investments. Therefore, the assessment of land and resources rights becomes a critical aspect of the value chain analysis.

Wood production takes years or decades. The multiyear length of the wood production cycle (considering that wood is commercially the most valuable forest product in most forests[9]) implies financing services that also are multiyear. The same is true for reforestation since the gestation period, before trees are harvested and commercial revenues accrued, may extend from one to several decades.

Forests provide multiple goods and services jointly from the same stand (multifunctionality). Especially in biodiverse forests, forest production is complex. The more biodiverse the forest, the more challenging it is to reach the level of scale and homogeneity in the quality of products that is important in the development and financing of value chains. The question of trade-offs and multiple forest functions and sustainability dimensions also deserves careful attention.

Forest production requires investments in processing and infrastructure that are larger than those for many agricultural products – the development of forest value chains is capital intensive. For the investment to make sense, access to sufficient supply of raw material is key. Hence, the productivity of the resource base and the processing capacity need to be carefully balanced. Infrastructure requirements, and logistics and connectivity with other support services are also important.

The implications of these dimensions are considerable given their impact on the scale of production and operation, security and stability, and the financing of forest value chains. These value chains operate in complex systems with far-reaching social and environmental effects. It is vital that a comprehensive understanding of forest value chains extends beyond forest products to reflect the multifunctional nature of forests.

[8] From 2 percent in 1990 to 13 percent in 2015 (FAO, 2022a).

[9] The State of the World's Forests 2022 report estimates that the commercial value of wood products is about USD 1 500 billion, while the value of traded NWFPs is around USD 150 billion. However, these are rough estimates since most NWFPs and woodfuel are traded informally and used for subsistence and, therefore, do not appear in official statistics (FAO, 2022a).

Box 2

Can a value chain approach be applied to ecosystem services?

In principle, a value chain approach can be applied to ecosystem services (see FAO's 2014 guiding principles).[i] For example, the climate mitigation (e.g. carbon sequestration) service performed by growing trees has a social value that is monetized, captured and augmented by activities such as the establishment of baselines and projections with monitoring and verification systems, together with the setting-up of an institutional infrastructure (e.g. rules, actors, registries). Additional value to a tonne of CO2 sequestered could be added by combining carbon sequestration with other attributes such as rigorous verification methods or complementary positive social or environmental outcomes.

Rawlins, De Lange and Fraser[ii] propose a framework for analysing value chains of ecosystem services. However, applications of a systems approach to ecosystem services are almost non-existent. This could be an area for further research.

Sources:

i FAO. 2014. *Developing sustainable food value chains – Guiding principles.* Rome. https://openknowledge.fao.org/server/api/core/bitstreams/e47d2ad8-5910-435e-a6b4-92dda2367dc7/content

ii Rawlins, J.M., De Lange, W.J. & Fraser, G.C.G. 2018. An Ecosystem Service Value Chain Analysis Framework: A Conceptual Paper. *Ecological Economics,* 147: 84–95. https://doi.org/10.1016/j.ecolecon.2017.12.023

Key takeaway messages

Forestry value chains encompass all activities from production to consumption, including both wood products and NWFPs. They are dynamic, market-driven systems, in which horizontal and vertical coordination are central dimensions and for which value addition and sustainability are explicit, multidimensional performance measures.

Segments like forest management and wood processing directly impact sustainability and local development. Once processed, forest products extend to various sectors (e.g. electric power generation, transmission and distribution, building construction).

Forest-based value chains offer significant ecosystem services contributing to societal welfare. They provide multiple benefits including landscape conservation, resilience to climate change, green jobs and high-value products.

A comprehensive understanding of forest-based value chains includes consideration of their non-marketable dimension, which requires special environmental considerations for sustainability assessments.

India - Farmers showing their paddy and poplar trees.

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CHAPTER 3

Analysing forest-based value chains

3. ANALYSING FOREST-BASED VALUE CHAINS

Value chain analyses are typically carried out to make the value chain more competitive, socially, economically and environmentally sustainable, and resilient based on the collection and analysis of extensive secondary and primary data.[10]

These analyses may serve various purposes, including improving livelihoods, promoting sustainable practices, generating green jobs, supporting the transition to a sustainable bioeconomy, promoting conservation and restoration, managing risks, enhancing resilience, and assessing the feasibility and attractiveness of investments or new products.

Depending on the primary purpose of the analysis, special interest lies in different areas such as adding value to primary products, accessing better markets, reducing transaction costs, identifying constraints, root causes of underperformance and leverage points, investing in new business models, promoting conservation and restoration, managing risks, assessing market potential and ensuring long-term profitability.

A comprehensive understanding of forest value chains enables decision makers and value chain actors to advance such interests while holding a systemic view of how the value chain is structured, functioning and performing.

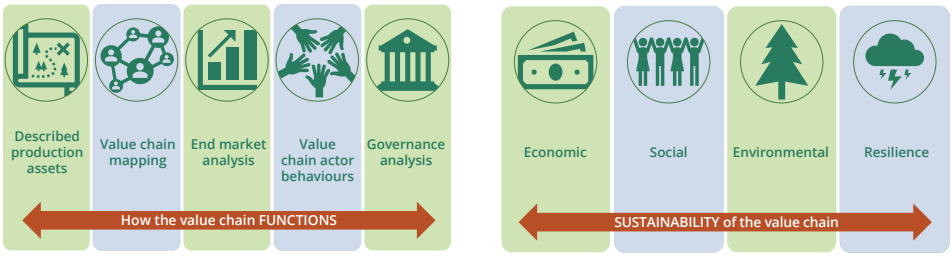
This document proposes a flexible approach allowing users to select the most relevant and appropriate analyses for their purposes. Each analysis may reveal opportunities for improvement and options for upgrading interventions. While several of the analyses are complementary (e.g. looking at how the value chain functions and at its sustainability may provide additional insights), emphasis on all analyses may not be necessary or feasible. The entire process can be expressed in Figure 2:[11]

[10] Sources of secondary data include censuses, survey databases (e.g. UN Comtrade, FAOSTAT, UNIDO, UNSD) and sources of international statistics on production of forest-based manufacturing industries. Primary data collection includes (depending on the context and available resources) observational visits, expert groups, focus groups, actor interviews, key informant interviews and surveys.

[11] FAO and UNIDO (2024) suggest breaking down the value chain analysis into a functional analysis and a sustainability assessment.

FIGURE 2

Areas of analysis of a forest-based value chain



Source: Adapted from FAO & UNIDO. 2024. *Developing sustainable food value chains - Practical guidance for systems-based analysis and design.* SFVC Methodological Brief. Rome and Vienna. https://openknowledge.fao.org/handle/20.500.14283/cc9291en

The first five analyses help to describe and understand the structure and dynamics of the value chain. These analyses aim to discover how scalable production is, how the products reach markets, the end market's characteristics, and elements such as actors, input and service providers, and the enabling environment, together with what governs forest use and the functioning of the value chain. Together, these analyses investigate stakeholders' behaviours (and the capacities and incentives that drive these behaviours) and identify the root causes of observed underperformances. They can help understand why actors choose particular markets, technologies or governance mechanisms over others that may seem more rewarding or efficient (e.g. using small and inefficient sawmills, inappropriate germplasm for planting, or harvesting at suboptimal harvest cycles). The last four analyses help identify critical sustainability issues (FAO and UNIDO, 2024). They help assess the economic sustainability of the value chain (e.g. economic infeasibility of any one stage of the chain can undermine its long-term survival), how the value chain contributes to social development objectives (like increased inclusion of marginalized or discriminated-against groups), and how it fosters improved environmental outcomes. An assessment of resilience is key to understand how vulnerable the value chain is to unexpected external shocks such as conflicts, pandemics and natural disasters.

Each of the assessments can also contribute to the identification of risks as well as possible risk mitigation measures. Risk analysis and developing a mitigation strategy will be explained in Section 5.3.3, which describes the selection and design of value chain interventions.

3.1 DESCRIBING FOREST PRODUCTION ASSETS

In most cases, the assessment of a forest-based value chain starts with a description and understanding of the extent (forest and land resources availability), nature and productivity of the forest resources owned or managed by the producers, organizations or enterprises. This includes estimates of the production levels that can be achieved

and sustained over time with existing assets, technologies, management regimes (e.g. silvicultural activities) and other use, collection and harvesting arrangements.

This is important, since building and maintaining a healthy forest resource base that can sustainably supply raw materials for wood and NWFPs is critical to the sustainability of the value chain. Production can originate from natural forests or from planted forests. Planted forests are needed when forests have been degraded, or to reduce pressure on natural forests. Forest assets also provide valuable ecosystem services such as climate mitigation, habitats for biodiversity, water regulation, soil protection, and recreational and cultural amenities. Healthy forests can enhance the resilience and diversity of landscapes that contribute to sustainable production and conservation.

Guidance on how to carry out an assessment of the forest resources is beyond the scope of this guide as there are multiple resources that can be consulted for this purpose, such as FAO (2006) or van Hensbergen, Shono and Cedergren (2023).

Information on forest governance and tenure is also important to define the commercial or customary rights that can potentially be scaled up to meet market requirements. A more thorough description of this is provided in Section 3.5, which describes the factors that govern forest use and the functioning of the value chain.

3.2 MAPPING VALUE CHAINS

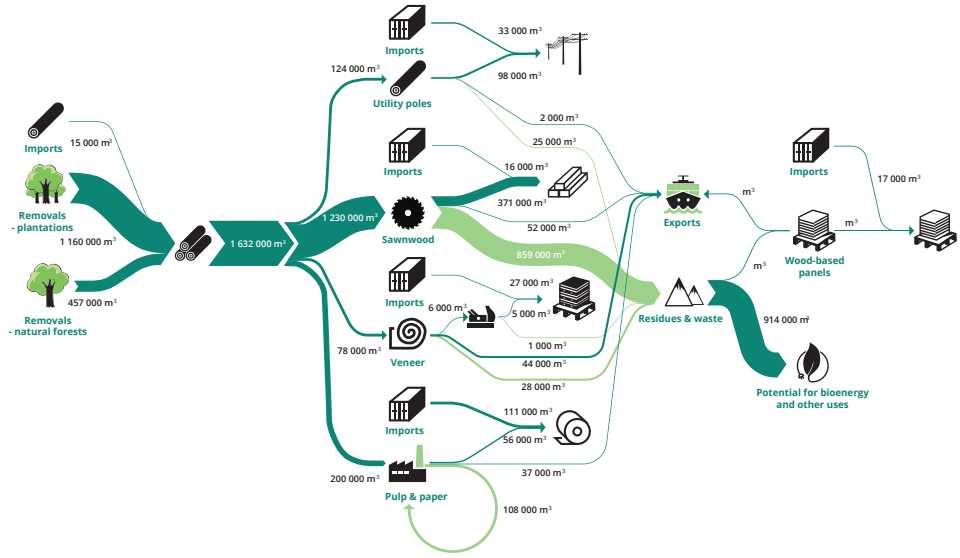
The second step of the analysis involves the study of the value chain structure and generates a **value chain map**. This is a flowchart that provides a general picture of the chain with the main value-adding steps from production to consumption, indicating the **functions and actors, the linkages between them, and the main channels.** The value chain map presents a picture of the current situation, facilitates an understanding of the structure, dynamics and dimensions of the value chain, and helps identify possible leverage points.

The development of the value chain map structures the analysis by tracking product flows and listing the functions and actors. Setting the value chain boundaries is an important early step in the process. The value chain may be subnational, national, regional or global. It may focus on intermediate markets rather than end markets (e.g. processors rather than end consumers). Sub-value chains for by-products (e.g. wood residues) may or may not be included.

The value chain map can be quite simple, illustrating, for example, only the material flows. Figure 3 depicts the wood flows in Tanzania in 2015 and highlights, for example, the potential value chains that can be developed from wood residues and waste, which accounted for more than half of removals of both planted and natural forests. As the figure illustrates the residues – 914 000 m3 were largely wasted in 2015.

FIGURE 3

Wood flows in the United Republic of Tanzania in 2015



Source: Private Forestry Programme. 2018. *Investment opportunities in the Tanzanian forest industry and bioenergy sectors: cluster analysis.* Helsinki. https://www.privateforestry.or.tz/resources/view/investment-opportunities-in-the-tanzanian-forest-industry

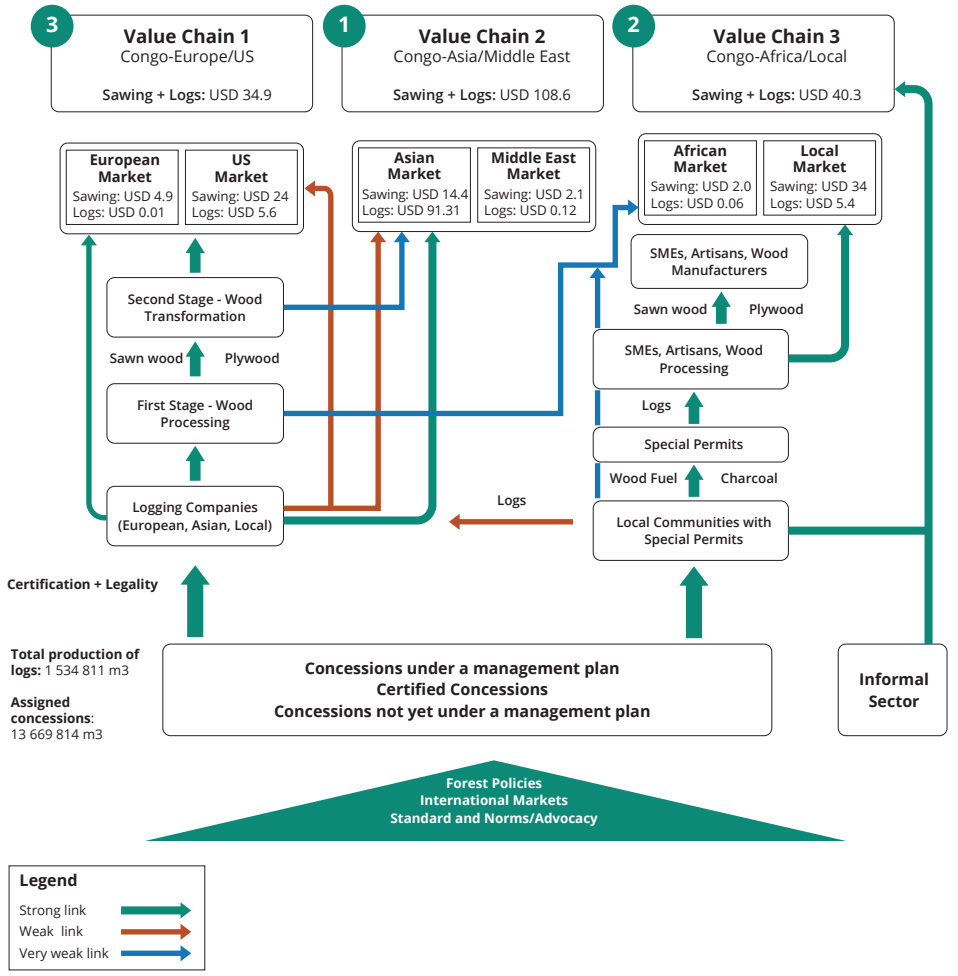
Value chain maps can provide more information than where products are transformed and consumed. The value chain mapping carried out by Bakouma (2017) (see Figure 4) also identifies the key actors in the chain: 33 logging companies and 34 units for processing logs into sawntimber (often integrated in the concessions). The chain directly maintains 13 092 jobs.

It shows that three timber value chains can be distinguished in the Congo Basin: a value chain whose dominant flows are to Asia, a value chain whose dominant flows are towards Europe, and a value chain whose dominant flows are within Africa itself. It shows that physical flows are dominated by the "Congo-Asia/Near East" chain which absorbs almost two-thirds of timber exports from the Congo.

Stakeholders found it useful to learn that the chain feeding into the African market was more important than the European, one both in monetary and development (e.g. jobs, livelihoods) terms (see Figure 4). The map helped illustrate the (underestimated) importance of regional value chains in terms of volumes as well as in terms of their development potential.

FIGURE 4

Mapping of wood product value chains in the Congo: value chain mapping of activities through dominant flows in Congolese markets

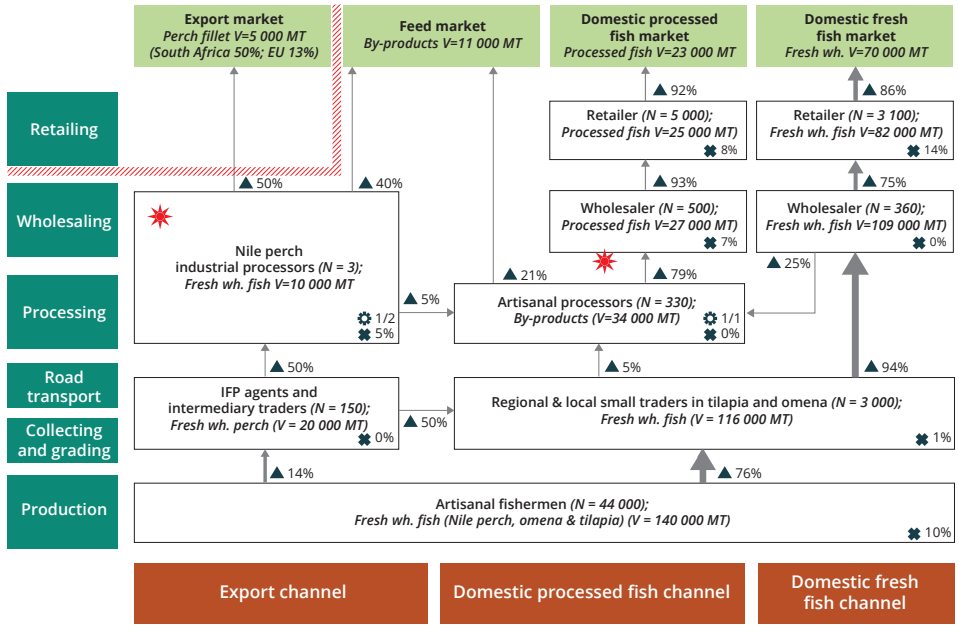


Source: Bakouma, J. 2017. *Évaluation de la chaîne de valeurs de la foresterie durable dans les pays REDD+ du Bassin du Congo: République du Congo.* Draft. FAO et WWF.

Depending on the scope of the analysis and the resources available, value chain mapping can include additional details. Figure 5 depicts capture fisheries value chains, and constitutes a good example of a value chain map describing material flows, the percentages of fish sold and self-consumed, the percentages of product loss and waste at each stage, and the key leverage points (where interventions would have an important effect on the whole chain).

FIGURE 5

Value chains of Lake Victoria capture fisheries



Legend

Ratios and percentages:
- Sold (%)
- Loss (%)
- Self-consumed (%)
- Conversion ratio

Overlays:
- N Number of actors
- V Volume in metric tons (MT)
- Leverage point

Flows and interactions:
- Service relationship
- Sale
- National border

Abbreviations:
- Wh. = whole
- IFP = Informal Fish Processors

Source: Adapted from USAID (2008) cited in FAO & UNIDO. 2024. *Developing sustainable food value chains – Practical guidance for systems-based analysis and design*. SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

Value chain mapping can also illustrate where actors are positioned geographically and within the chain structure, thereby indicating power structures related to flows of benefits and information (van Dijk and Trienekens, 2012; Helmsing and Vellema, 2011).

Useful tools and resources

FAO has developed the Value Chain Analysis Tool (VCA Tool), which can be used for this purpose: https://www.fao.org/sustainable-food-value-chains/training-and-learning-center/details/en/c/327855/. This tool allows users to systematically gather, store and manage data for implementing cost–benefit and value-added analyses.

There are multiple ways of displaying material flows. Examples of interactive Sankey diagrams of woody biomass flows in the European Union can be viewed here: Interactive Sankey diagrams of woody biomass flows in the EU and Member States | Knowledge for policy (europa.eu)

3.3 ANALYSING END MARKETS

The end-market analysis is essential for understanding whether the value chain has the potential to be profitable and scalable. An accessible and expanding market is a critical feature for business and investment decisions. The end market is where the final transaction takes place, that is, where consumers purchase forest products for consumption (not for reselling), or after the products have reached the end of their initial use cycle. The end market ultimately determines the value of the final product.

The purpose of an end-market analysis is to:

- understand the market, the players and how they operate, and the institutional environment (some of the formal and informal rules of the market can be further elaborated upon during the governance analysis);
- assess the growth potential of various markets;
- identify market opportunities (e.g. niche markets, underutilized market channels, targeted segments) and the critical success factors and unique selling propositions for such opportunities;
- assess competitive positions against competitors; and
- provide the starting point and focus for the value chain strategy.

The end-market analysis provides a detailed understanding of existing and potential end markets and is key to identifying value chain upgrading interventions. It may include an assessment of market sizes and growth rates, trade flows, prices and price trends, market drivers, market segments, order specifications, critical success factors, unique selling propositions, and consumer perceptions and behaviours.

Market opportunities could include not only those for currently marketed products (e.g. logs) but also those for potential value-added products that may not yet exist in the value chain. An example is the potential market for mass timber in countries and regions that are yet to experiment with this product in building and construction. Since this value chain would utilize a range of species, grades and uses, the analysis would need to cover markets for each species. Using secondary data, market reports, interviews with local retailers and overseas buyers, and a (domestic) consumer survey, a detailed understanding of existing and potential end markets is established.[12]

[12] See Resource Library | Marketlinks for examples.

Box 3

Identifying opportunities and challenges for non-wood forest products through market assessments

Macy and Denhere (2023) carried out a non-wood forest product (NWFP) market assessment about the commercial viability of five NWFP value chains: bee products, mushrooms, wild amaranth, kiswita and ntungulu. Several themes and issues emerged from the study: (1) worldwide consumers and industries are largely unaware of several of the products, and commercial utilization is very low (lengalenga, kiswita and ntungulu); (2) effective marketing and market development are vital to the successful growth of these value chains; (3) scientific research to support the claims of nutritional and medicinal efficacy is lacking yet necessary to effectively grow the value chains; (4) inconsistent quality and no common standards are impediments to commercialization; (5) small, fragmented supply chains with seasonal supply are challenging for large customers to manage; (6) improved tools and equipment would enhance efficiency and quality; (7) lack of plant inventories prevent any assessment of sustainably harvestable supplies of plant and mushroom NWFPs; (8) organic and Fair Trade certification might be helpful to penetrate certain markets, but they are quite costly; and (9) poor to non-existent road networks, shipping distance, time and costs, and lack of a cold chain inhibit the growth of perishable value chains.

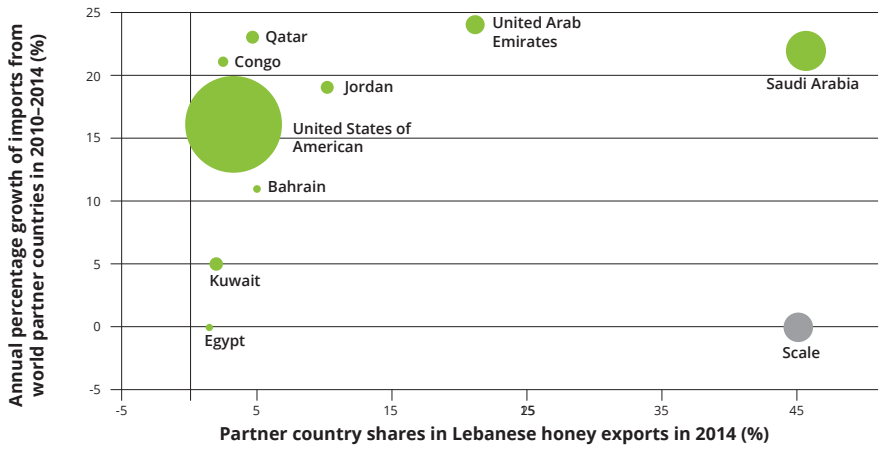
The study included an analysis of the factors that contributed to exponential growth in markets of "similar" products: manuka honey, maqui berries, açaí, quinoa and wild mushrooms. The comparison highlighted the importance of: (1) clarifying what is **uniquely valuable** [e.g. health benefits] about the product; (2) **marketing and branding**; and (3) **supporting** the upgrading of skills, quality enhancements and penetration of new markets.

Source: Macy, J. & Denhere. 2023. *Non-wood forest product market assessment.* Draft. FAO and CIFOR.

An exported product's prospects for market diversification can be clarified using a trade map bubble chart (see Figure 6).

FIGURE 6

Export market diversification prospects for honey in Lebanon



Sources:

- International Trade Center (ITC), calculation based on Lebanon Ministry of Economy and Trade data. Bubble size represent partners share in world imports. Bubble scale is 2 percent. Countries in the chart represent 97.5 percent of Lebanon's export of honey.
- Hamade, K. 2016. *Non-wood forest product value chains in Lebanon.* Rome, FAO. https://openknowledge.fao.org/handle/20.500.14283/i6506en

Useful tools and data sources for market analyses

- USAID's End Market Research Toolkit (Value Chain End-Market Research Toolkit – Workcard Format [marketlinks.org])[i]

Examples of sources of data on markets and trade:

- National statistics on markets and trade
- Consumer price index data (national statistics)
- Market studies
- Trade show reports
- Forest Products Annual Market Review: https://unece.org/forests/publications/forest-products-annual-market-review-2022-2023 [ii]
- International trade maps and market information: www.intracen.org/itc/market-info-tools/trade-statistics/
- UN Comtrade Database: https://comtrade.un.org/
- The Observatory of Economic Complexity (OEC) on trade data: http://atlas.media.mit.edu
- https://oec.world/en/visualize/tree_map/hs92/export/guy/show/0306/2017/
- https://dec.usaid.gov/dec/content/search.aspx
- Chatham House resource trade database: https://resourcetrade.earth/

Sources:

i USAID. 2008. *End Market Research Toolkit – Upgrading Value Chain Competitiveness with Informed Choice.* Washington, DC. https://www.marketlinks.org/sites/default/files/resource/files/value_chain_end_market_toolkit.pdf

ii UNECE & FAO. 2023. *Forest Products Annual Market Review 2022–2023.* Geneva and Rome. https://unece.org/sites/default/files/2023-11/FPAMR23_WEB.pdf

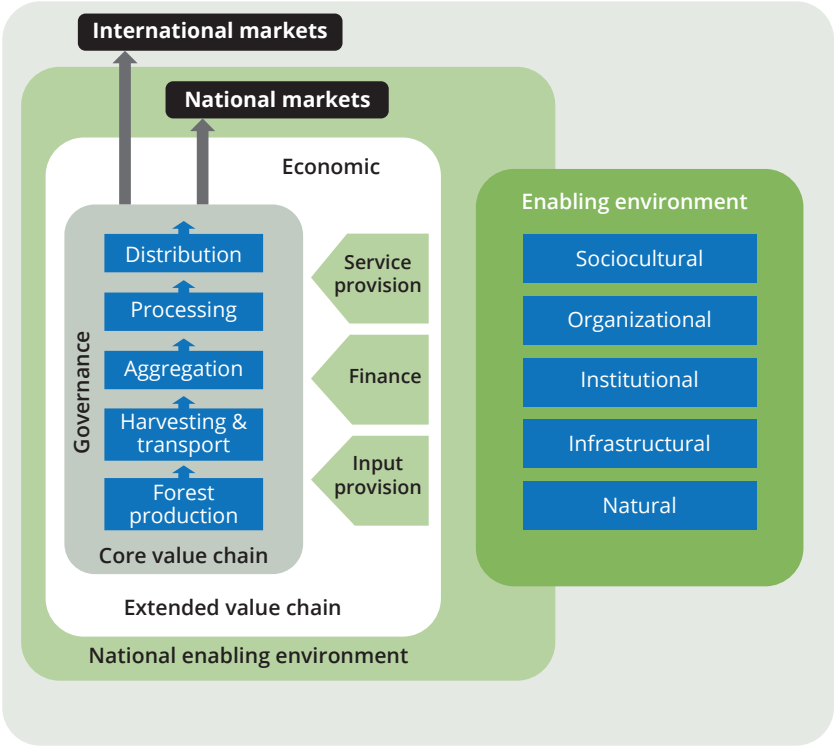
3.4 VALUE CHAIN ACTORS, PROVIDERS OF SUPPORT SERVICES AND THE ENABLING ENVIRONMENT

Following the mapping of the value chain and an assessment of the end market, the next step of the analysis is to identify concrete and feasible opportunities to reduce operational inefficiencies (bottlenecks), social costs and the ecological footprint, or to improve economic, social or environmental outcomes, or both these things. This involves analysing the behaviours of the value chain actors and support service providers, and the social and environmental context within which they operate (see Figure 7). Factors to consider are:

- **Actors in the core value chain.** This includes forest managers and producers (e.g. farmers, producer organizations, communities, companies), collectors, aggregators, transporters, processors, distributors and wholesalers.
- **Input suppliers, and finance and other service providers in the extended value chain.** This includes input providers (e.g. nurseries, local financial institutions).
- **The enabling environment.** This includes sociocultural aspects as well as institutional, organizational and infrastructural dimensions. It may also include

FIGURE 7

The sustainable forest-based value chain framework



Source: Adapted from FAO. 2014. Developing sustainable food value chains – Guiding principles. Rome. https://openknowledge.fao.org/server/api/core/bitstreams/e47d2ad8-5910-435e-a6b4-92dda2367dc7/content

macroconsiderations (e.g. demographic trends) with direct influence on the functioning and sustainability of the value chain.

The analysis of the **actors in the core value chain** examines their current business models and behaviours in order to understand how they currently operate (e.g. using certain harvesting methods or processing technologies, existence of and types of contracts) and why they are (or are not) already taking advantage of known market or upgrading opportunities (e.g. they may be missing information, be incentivized to stick with the status quo, or face capacities constraints).

At a minimum, this piece of the analysis gathers information on: (1) who the actors are and what the differences are among those that perform similar functions; (2) the importance of the value chain in their overall net income; (3) revenue and cost estimates for key actor types – this information is needed to compile operating accounts, help assess how value addition takes place, and how value addition is distributed among the various value chain actors; and (4) the current situation (trends and drivers of actors' behaviours).

The analysis of the value chain actors may also cover some of the following aspects:

- location (to enable the geographic mapping of the value chain);
- nature of each actor (e.g. age, education, ethnicity, gender, wealth, household size);
- functions covered by each actor (e.g. production, intermediation, aggregation, processing);
- functions covered by public agencies (e.g. regulations imposed on production and trade, enforcement of the rule of law, existence and compliance with traceability systems, monitoring);
- procurement practices (e.g. quality of inputs, perception of input, service and finance providers);
- production practices (e.g. activities, labour versus capital intensity, quality standards);
- marketing practices (e.g. contracts, markets, prices obtained, transaction mechanisms);
- infrastructure and equipment used (e.g. capacity, sophistication, state of repair, energy source);
- functional performance (e.g. volumes, loss rates, conversion rates, labour productivity);
- competitiveness (e.g. comparison of functional performance to benchmarks);
- general business skills (e.g. accounting, pricing, planning, negotiating); and
- main challenges and risks faced by each actor.

Intermediaries, such as wholesalers, traders, importers or brokers, are often important actors in the core of forest-based value chains. Intermediaries work between forest producers or farmers, processors, distributors and retailers and fulfil a variety of connecting and facilitating roles in the value chain. They often facilitate forest producers' access to local, regional or diverse market channels as well as financing. Intermediaries in the value chain can take risks, set up sales, and manage complex relationships with downstream buyers, distributors and other stakeholders. Intermediaries and middlemen should be included in the analysis and their potential role should be considered in upgrading the value chain.

The analysis of **input suppliers, finance and other service providers** looks at the current performance of the extended value chain, including the availability, accessibility, effectiveness and quality of inputs and services, the dynamics (what is changing) and drivers (why this status, why these changes). It is important to clarify that here the analysis moves from the demand side of inputs and services (i.e. value chain actors) to the supply side of these inputs and services, how this supply matches (or does not match) the demand (from value chain actors), and the reasons for any mismatch between demand and supply. The objective of the analysis is to identify critical constraints in inputs and services provision and factor in markets that represent

opportunities for upgrading. Local banks can facilitate the flow of financing between international development funds and local producers or SMEs.

Three main types of support services are assessed:

- provision of physical inputs (e.g. seeds, seedlings, fertilizer, energy);
- provision of non-financial services (e.g. technical assistance, equipment maintenance); and
- provision of financial and risk management services (see Box 4).

Box 4

Assessing the provision of financial services

Assessing the provision of financial services (both formal and informal) is critical to understanding how value chain actors currently finance their activities, what types of challenges they encounter, and how future investments could be financed (by whom, and with which terms and conditions).

Assessments of financial service provision can provide an overview of available financing sources and instruments, help understand lending patterns to small and medium-sized enterprises (SMEs) in the agrifood sector and lending terms (e.g. interest rates), and the financial sector's appetite for investing in enterprises and organizations engaged in forest-based value chains. They can also help understand the role played by financial intermediaries in bridging the gap between actors in the core value chain and financial institutions. These intermediaries may include public institutions, local finance institutions, non-governmental organizations (NGOs), semi-formal and microfinance organizations, and also private individuals.[i]

Such assessments shed light on the factors underpinning the success of innovative financing models (e.g. business segmentation, value chains involved, local policy context), or on the financial institutions' knowledge and capacity to assess credit risk and bankable opportunities, or to carry out a thorough due diligence assessment of the technical and financial viability of requests from agribusinesses.

These factors can affect their level of appetite to lend, inform the selection of appropriate lending models, and increase their overall service outreach.[ii, iii]

For example, an assessment of rural finance in the Northwestern Province of Zambia[iv] revealed that formal finance is accessible primarily to the male and urban population, while rural communities and women rely almost exclusively on the informal financial sector. The study confirmed the importance of supporting digital finance, addressing gender gaps, and further exploring the potential of carbon credit mechanisms. The study also identified promising financial institutions that, with support, could develop tailored products for actors involved in non-wood forest product (NWFP) value chains.

In sum, finance assessments can help identify development interventions with the potential to scale up access to appropriate finance for forest value chain actors.

Sources:

i Macqueen, D.J., Benni, N., Boscolo, M. & Zapata, J. 2018. *Access to finance for forest and farm producer organisations (FFPOs).* FAO and IIED. https://www.iied.org/sites/default/files/pdfs/migrate/13606IIED.pdf

ii LadyAgri. 2022a. *How do we bridge the financing gap for agri-SMEs and cooperatives.* Report prepared for FAO.

iii LadyAgri. 2022b. *Overview of financial context, institutions and products for smallholder farmer financing.* Report prepared for FAO.

iv Cortese, M. & Moonga, R. 2023. Rural Finance Assessment North Western Province, Zambia. Draft.

The analysis of the enabling environment looks at what influences the performance of value chain actors and service providers. Many systemic (root) causes of value chain underperformance, and thus some of the greatest opportunities for improving value chain performance, lie in this broader environment rather than the chain itself. While a systematic analysis of all elements may not be necessary or appropriate in all circumstances, the assessment may reveal aspects of the value chain enabling environment that impact transaction costs, fairness, transparency or inclusivity. An example is the existence of barriers to entry that protect the profitability of selected businesses.[13] Elements to consider include:

- **formal institutional elements** (such as national forest policies, regulations, laws and standards established by authorities);
- **informal sociocultural elements** (such as norms, unwritten codes of conduct, traditions and cultural preferences, levels of corruption and crime, and social habits);
- **organizational elements** (such as forest and environment ministries, public agencies, interprofessional associations, research and development facilities, and any relevant ongoing projects and programmes);
- **infrastructural elements** (such as electricity grids, roads, ports, agroprocessing parks, and information and communications technology [ICT] networks); and
- **natural elements** (such as climate and biophysical conditions).

Depending on local circumstances, socioeconomic considerations (e.g. demographic and urbanization trends) may also play an important role in the sustainability of the value chain. For example, rapid rural population growth or, conversely, heavy migration to urban areas may call into question the sustainability of the value chain in certain areas (Vincent, Curran and Ashton, 2021).

3.5 ANALYSING THE GOVERNANCE FACTORS IMPACTING FOREST USE AND THE FUNCTIONING OF VALUE CHAINS

Forest governance refers to the formal and informal rules, organizations and processes through which public and private actors, including formal and informal institutions, smallholder and Indigenous Peoples' organizations, SMEs and large enterprises, civil society organizations and other stakeholders negotiate and articulate their interests to make and implement decisions. Since forest resources are often publicly owned, under a common property or management regime, or open access (in many cases leading to unclear land tenure), understanding who makes decisions about what to do with forests, and how decisions are made are of paramount importance especially in the value chain stages associated with the **use and management of forest resources.** It is here that overexploitation of the resources, and degradation and conversion of

[13] See for example FAO (2023b). There is also a course: https://elearning.fao.org/course/view.php?id=974

forest areas to other land uses seriously undermine the sustainability of forest-based value chains.

Poor governance is often at the root of actions that result in the depletion of public goods to the benefit of private gain, or the harming of long-term prospects to obtain short-term gains, or an unfair distribution of benefits, costs and risks. Governance issues are often also at the root of the limitations or exclusions that some actors experience to protect economic gains for selected businesses.

In contrast, "good" or "responsible" governance is characterized by elements such as: adherence to the rule of law; transparency and low levels of corruption; stakeholder participation in decision-making; adequate equal rights for stakeholders; accountability; a low regulatory burden; a coherent set of laws and regulations – both within the forest sector and in other sectors that influence forest management; the proper implementation of laws; political stability; and sound capacities to govern efficiently and effectively (Bojić, Clark and Urban, 2022; FAO, 2022b).

An analysis of forest governance may look at:

- What rules (formal and informal) and rights (including traditional and customary) regulate forest use and the distribution of benefits, costs and risks, as well as their application. For example, value chain assessments may uncover undue influences in the timing and access to permits to use, transport or export forest products,[14] thereby penalizing some groups to the advantage of others.
- The existence and use of private sector mechanisms, such as voluntary certification, to support sustainability and legality in the supply of forest products.
- International measures to support timber legality and promote good governance, such as the European Union's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan and payments for environmental services (PES) schemes, such as reducing emissions from deforestation and forest degradation (REDD)+.

Value chain relationships, interactions, linkages and governance are important to understand how different actors make decisions, interact, negotiate, and build alliances (Bojić, Clark and Urban, 2022) and how incentives, disincentives and differences in power between groups and actors affect their interactions. Understanding vertical and horizontal linkages can also help assess opportunities to access finance (e.g. through value chain finance, group collateral). The assessment may cover: a) vertical and horizontal linkages; b) market power; c) trust; and d) social capital.

[14] There are connections between the economic analysis and the governance analysis. Multiple scholars (see, for example, Karl, 1997 or Bhattacharyya and Hodler, 2010) and practitioners have noted that corruption and other governance issues are more common where there are significant opportunities for "rent capture" (how certain people or organizations unfairly profit from resource extraction by abusing their power at the expense of the wider society) or "elite capture", or a lack of transparency, participation or accountability. Ingram (2014) also suggests that, as the profitability of a value chain increases, so does the risk of corruptive practices.

- **Vertical linkages** refer to the relationships between different stages of a value chain, from raw materials to their transformation into the final product. Understanding vertical linkages and what influences them enables to streamline processes within the value chain by identifying bottlenecks and inefficiencies at different production stages. Addressing these optimizes resource allocation and production methods, benefiting businesses, ensuring smoother operations and increasing competitiveness. Contracts are an example of vertical linkages (including land leases, outgrower deals, off-take agreements), which can be designed to foster fairness and transparency. The timely sharing of accurate information among actors also facilitates informed decision-making and streamlined transactions, enhancing efficiency and transparency across the chain.
- **Horizontal linkages** are relationships among actors at the same level, such as competitors or collaborators. Typical examples of horizontal linkages are a producer organization or an outgrower scheme, where smallholders make agreements with larger asset holders. Understanding horizontal linkages helps identify collaboration opportunities, foster partnerships or adjust strategies to gain a competitive edge. It also aids in building networks that could potentially lead to enhanced market positioning. A comprehensive view of the interconnections within the value chain can assist in formulating policies that support fair competition, encourage collaboration and address challenges within the chain. Moreover, it helps in designing interventions that promote sustainability, resilience and equitable distribution of benefits.
- **Market power** is about the control and influence wielded by certain actors within the value chain. Understanding who holds this power and how it is exercised (e.g. who are the price setters and the price takers) is key, as it affects how benefits and costs are distributed, and how chains perform overall. Improving vertical and horizontal linkages can be a way to alleviate imbalances in market power. The presence or absence of quality premiums associated with meeting legal and sustainability certification standards acts as a significant leverage point. These premiums often determine market access, pricing structures and competitiveness, impacting the positioning of various actors within the chain.
- **Trust**, built through reliable and consistent interactions, fosters cooperation and joint problem-solving, and may reduce transaction costs. Cultural factors (e.g. cultural norms, values and practices) shape how trust is perceived and established among stakeholders. Understanding and respecting these cultural elements are crucial for nurturing strong and enduring relationships within actors. Trust is undermined by incidents of cheating, corruption, non-payment or other breaches. When they can be established, dispute resolution mechanisms can play a crucial role in building trust.
- **Social capital** examines the influence of social networks, including family and community ties, on the access to resources within the forest value chain. It also considers whether there are social obligations to collaborate in groups or share benefits with members of these networks.

Understanding these dynamics is crucial not only for ensuring sustainability, efficiency, competitiveness and resilience (see Box 5) but also for mitigating risks associated with overexploitation, resource degradation, and inequitable distribution of benefits and costs.

Box 5

Governance and non-wood forest product value chains in Cameroon

In her PhD dissertation, Ingram[i] examined eight non-wood forest product (NWFP) value chains from Cameroon, sold in markets locally and exported worldwide. The governance analyses led to important lessons, which were relevant to the design of interventions to improve the functioning of the value chains. For example, she concluded that focusing on regulations alone in the current sociopolitical and economic context in the Congo Basin would not make a chain sustainable. Instead, making chains sustainable would require a mix of arrangements, and the ability, resourcefulness and power of participants to define the "nuts and bolts" of new governance arrangements and replace ineffective institutions, such as corruption.

Multiple, complementary arrangements were shown to be more effective in creating sustainable livelihoods by providing bundles of rights and responsibilities governing a species, its ecological niche, chain activities and benefits. Poor and vulnerable groups could gain more control and value when aided by initiatives. However, the intricate links in chains resulted in some unexpected positive outcomes, such as for the honey value chain, and negative ones, such as for the *Prunus africana* value chain. The cases illustrate that striking a balance between livelihoods and long-term sustainability can be a challenging endeavour when governance arrangements are "inadequate" for a lucrative value chain. The temptation to favour short-term economic benefits at the expense of the sustainability of the underlying natural capital can be strong.

Source:

i Ingram, V. 2014. Win-wins in forest product value chains? How governance impacts the sustainability of livelihoods based on non-timber forest products from Cameroon. Universiteit van Amsterdam. Thesis, externally prepared. https://www.cifor-icraf.org/knowledge/publication/4581/

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Cameroon - A pile of wood plank in the wood market in Douala.

Key takeaway messages

- Value chain analyses help identify ways to improve the competitiveness, sustainability and resilience of selected value chains. They can also serve specific purposes such as improving livelihoods, creating green jobs and assessing investment feasibility.
- Value chain analyses can adopt a flexible approach where users emphasize specific aspects of the value chain functioning and performance, depending on their specific needs.
- The first set of analyses help clarify the structure and dynamics of the value chain. They investigate stakeholders' behaviours and identify the root causes of observed underperformances. They can help understand what is driving actors to make certain decisions, such as those related to which markets to target, and which technologies or governance mechanisms to adopt.
- The second set of analyses help identify critical sustainability issues (economic, social, environmental) and assess resilience.
- An assessment typically starts with describing forest production assets, including the extent, nature and productivity of resources.
- Value chain mapping provides a visual representation of the chain's structure, from production to consumption.
- An end-market analysis is crucial for understanding profitability and scalability potential.
- Analysing value chain actors, support service providers and the enabling environment helps identify critical constraints in the value chains and their root causes, as well as opportunities for improvement.
- A governance analysis examines formal and informal rules affecting forest use and value chain functioning.
- Understanding vertical and horizontal linkages, and their drivers (such as market power, trust and social capital) is important for understanding the behaviours and interactions of value chain actors.

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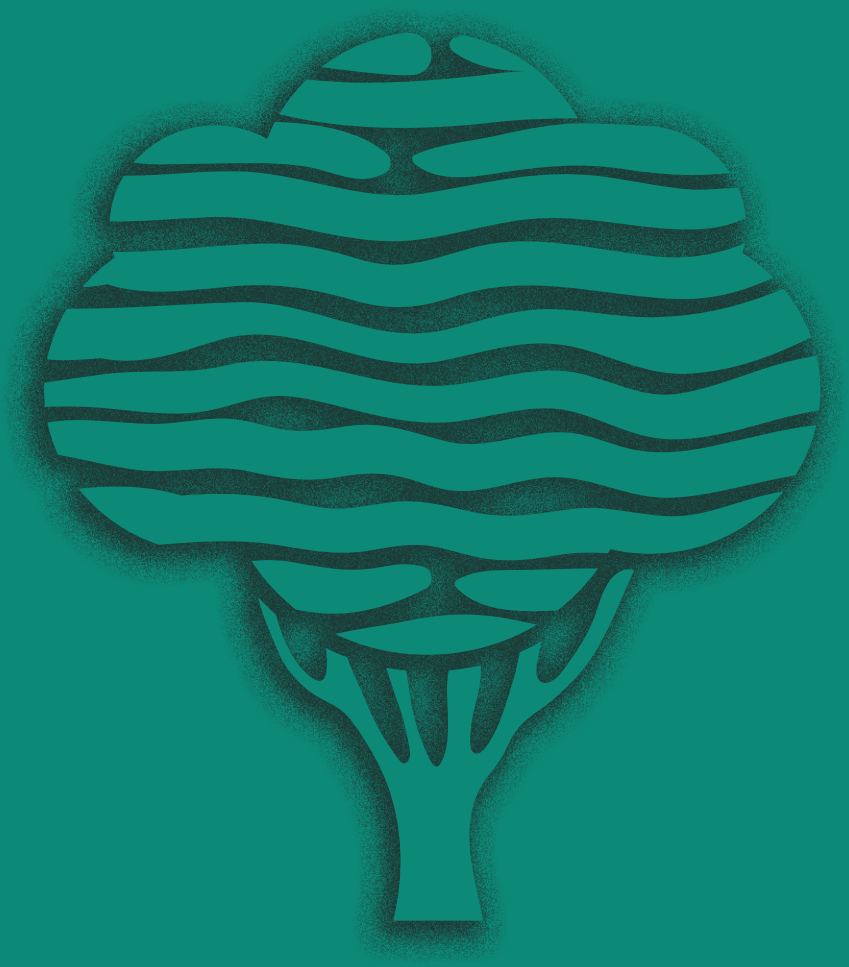
Democratic Republic of the Congo - Agricultural and forestry research.

CHAPTER 4

Sustainability assessment



4. ASSESSING THE SUSTAINABILITY OF VALUE CHAINS

To identify critical sustainability issues, sustainability is generally assessed in four areas (FAO and UNIDO, 2024):

1. **Economic sustainability** measured as profitability, employment, value addition, effects in the national economy, international competitiveness, and value for consumers in the domestic market.
2. **Social sustainability** measured as inclusiveness, decent employment, gender equality, social and cultural capital, food security, safety and nutrition, institutional strength and youth involvement.
3. **Environmental sustainability** measured by the impact of value chain activities on the extent and quality of forest resources, the climate, biodiversity, soil, water, and waste production.
4. **Resilience** measured by how vulnerable the value chain is to unexpected external shocks such as an economic crisis, a pandemic, social unrest or a natural disaster.

Again, depending on the circumstances, some or all the analyses may be selected. These economic, social and environmental aspects of sustainability are illustrated in Figure 8.

FIGURE 8

The sustainability dimensions with sample categories

Sources: Adapted from FAO & UNIDO. 2024. *Developing sustainable food value chains – Practical guidance for systems-based analysis and design.* SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en; and FAO. 2014. *Developing sustainable food value chains – Guiding principles.* Rome. https://openknowledge.fao.org/server/api/core/bitstreams/e47d2ad8-5910-435e-a6b4-92dda2367dc7/content

Note: SFVCD: sustainable food value chain development.

4.1 ASSESSING ECONOMIC SUSTAINABILITY

The economic analysis focuses on actor-level contributions to economic growth. Information on the actor level can then be aggregated to assess the overall value chain contribution to the economy. The economic assessment of the value chain helps determine: (i) where and how value is created; and (ii) how value is distributed along the value chain. It assesses the components shown in Table 1:

Profitability is conventionally assessed using a cash flow analysis as a foundation for calculating several indicators such as gross and net profit, return on investment, internal rate of return and net present value. In the context of sustainable forest-based value chains, the cash flow assessment should consider the factors that enable sustainability: sustainable wood or NWFP sourcing, use of clean or renewable energy, environmentally sound processing technologies, decent employment and working conditions (health and safety) for the labour force, and the multiyear production cycles. The latter means that the cash flow analysis should cover multiyear periods – not a common practice with most agricultural crops. If the main purpose of the value chain analysis is to mobilize private finance, profitability will be a crucial metric of the economic assessment.

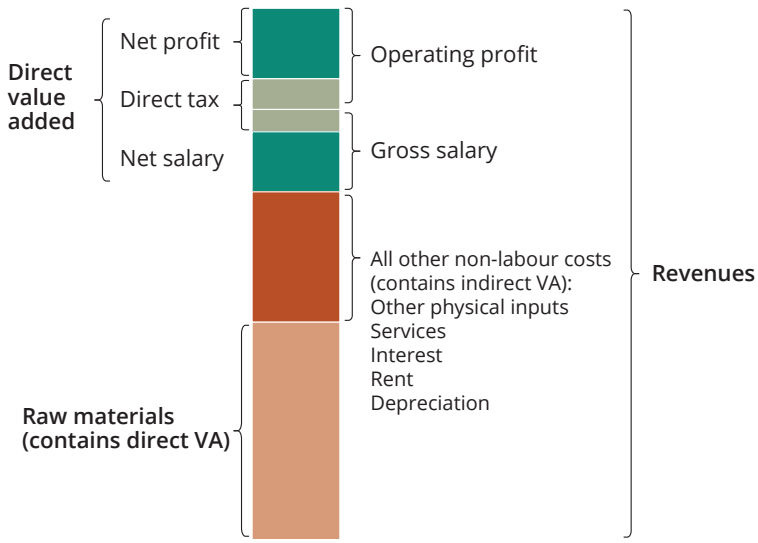
TABLE 1

Indicators for assessing economic sustainability

Categories	Examples of indicators
Profitability (financial analysis)	Revenues Operational costs Capital expenditure Net income Return on investments
Employment	Job creation along the value chain and in support services provision Number of households in forest production Average wages paid (by type)
Value added	Share of processed wood in total wood production Direct, indirect and total value added
Impacts on the national economy	Fiscal revenue Export earnings
International competitiveness	Trade balance of forest products Comparative advantages and disadvantages Cost structure compared to international industry benchmarks Business environment, attractiveness of investments
Value for consumers (domestic market)	Price differential paid by consumers in the domestic market when compared to neighbouring markets

FIGURE 9

The value-added concept



Source: FAO & UNIDO. 2024. Developing sustainable food value chains – Practical guidance for systems-based analysis and design. SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

Note: VA: value added.

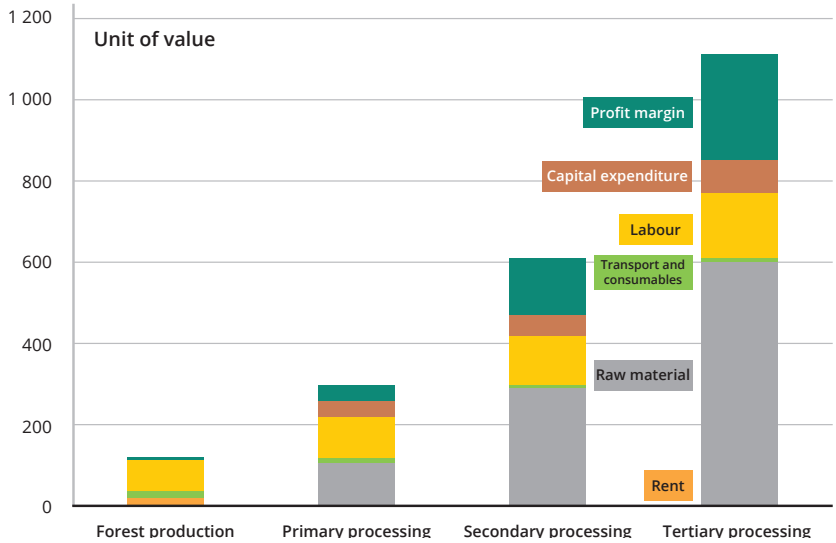
Value added is the difference between the revenue from the goods sold and the total cost of goods and services purchased from other firms (see Figure 9). Financially, it is computed as the sum of wages, profits, taxes, interest, depreciation and rent,[15] reflecting the value added captured by employees (as wages), business owners (as profits), the government (as taxes), and other stakeholders, such as banks (interest), equipment sellers (depreciation) and landlords (rent).

Figure 10 offers a hypothetical illustration of the value-added components of a wood value chain. The economic assessment may indicate which sections of the value chain require improvements in profitability (needed for economic sustainability) or in inclusiveness.

[15] Which respectively remunerate labour, entrepreneurial capacity, financial capital, capital assets, and land and natural resources.

FIGURE 10

Hypothetical illustration of value-added components in a wood value chain



Source: Authors' own elaboration.

Employment generation measures job generation as well as the quality of employment: informal jobs becoming formal, and improved conditions for workers with regard to decent incomes, and health and safety. Employment quality can be measured by remuneration, working hours, social security coverage, the type of contract, the degree of job security, and access to paid leave, parental leave, sick leave and career advancement opportunities, to name a few.

Effects on the **national economy** are indicated traditionally by gross domestic product (GDP) contribution and employment generation with multiplier effects (covering indirect impacts). Further impacts on the **bioeconomy** can be indicated by how efficiently raw materials (wood and non-wood) are used, and how residues are used for secondary products; how much carbon is stored in forests and in the products made from wood, including by using wood to substitute fossil fuels and other, more carbon-intensive materials.

International competitiveness can be measured with revealed comparative advantage, and participation and position in the global value chains. Comparative advantage can be a result of the availability of raw materials (forest resources), infrastructure and logistics, skilled labour, strategic location in relation to key markets, and level of research and development. Position in global value chains can be indicated by trade share in global markets.

Value for consumers refers to the value of the value chain products as perceived by consumers in the domestic market. This perceived value can be measured by aspects

such as taste, convenience, nutritional value, and safety and price, as compared to similar products. This perceived value translates into consumer willingness to pay, potentially more than the market price, and so will incentivize consumers to purchase the product while also capturing a "consumer surplus" (which is the difference between their willingness to pay and the market price).

Each of the above components can be measured by a number of indicators. These indicators can also be used to estimate the contribution of the value chain analysed to the bioeconomy.

4.2 ASSESSING SOCIAL SUSTAINABILITY

This part of the sustainability assessment measures the social impacts of the value chain activities (positive and negative) across core social categories (FAO and UNIDO, 2024). Table 2 provides examples of social sustainability indicators associated within each category. The analysis can be summarized in a hotspot map (showing social sustainability categories) or a spider diagram.

TABLE 2

Examples of social sustainability categories and indicators

Categories	Examples of indicators
Inclusiveness	Wages and employment distribution (e.g. gender pay gap, inclusion of youth and other marginalized and vulnerable groups) Value added distributed to marginalized groups of interest Poverty and vulnerability among value chain actors Discrimination
Decent employment	Employment diversity and inclusion Fair labour practices and working conditions Formalization of jobs (share) Job safety and security Job attractiveness
Food security and safety, and nutrition	Availability of food Accessibility of food Utilization of food (nutrition, safety) Stability of food (trends)
Gender equality and women's empowerment	Women's economic involvement Gendered division of labour Gendered access to productive resources Women's decision-making and leadership
Youth inclusion	Youth employment rate Youth entrepreneurship Training and skills development Youth representation in decision-making

Source: Adapted from FAO & UNIDO. 2024. *Developing sustainable food value chains – Practical guidance for systems-based analysis and design.* SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

Below is a short explanation of what these categories are, and why they are relevant for assessing the social sustainability of the value chain.

Inclusiveness aims to ensure that everyone, regardless of their social, economic or political status and identities, including race, ethnicity, gender, age, beliefs, geographical location, health status and migrant status, has the opportunity to engage in and benefit from forest-based value chain activities. Exclusion manifests itself in multiple ways, often more severely in rural areas: rights may not be recognized or protected; access to resources and services may be limited; and some important groups may be prevented from playing an active role in community decision-making processes. Inclusive structural changes in value chains (e.g. improved quality of services and access to productive and natural resources) can help to address inequalities and ensure respect for human rights (FAO, 2024a).

According to FAO (2012), **"decent rural employment"** refers to any activity, occupation, work, business or service performed by women and men, adults and youth in rural areas that: i) respects core labour standards as defined in International Labour Organization (ILO) conventions;[16] ii) provides an adequate living income; iii) entails an adequate degree of employment security and stability; iv) adopts minimum Occupational Safety and Health (OSH) measures, which are adapted to address sector-specific risks and hazards; v) avoids excessive working hours and allows sufficient time for rest; and vi) promotes access to appropriate technical and vocational training (Ssanyu and Mubiru, 2021).

Food security can be defined as the state in which:

> All people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security is fully achieved when food is physically available (availability), economically, physically and socially accessible (access), and usable (utilization); and when these three conditions are stable over time (stability). Each of these dimensions of food security is affected by the health and vigour of forests and trees outside forests; ensuring sustainable forest management practices is therefore vital for sustainable food security and nutrition (FAO, 2024b).

Gender equality and women's empowerment is central to FAO's mandate of eradicating hunger, malnutrition and rural poverty. Empowering women can generate significant development opportunities for them and lead to important spillover benefits for their households and communities. Women living in forest communities have highly specialized knowledge on forests in terms of species diversity, management and use of resources, restoration practices, as well as product transformation and conservation, which are directly linked to food consumption and health. Valuing women's knowledge, enhancing their skills, enforcing and formalizing their rights, and

[16] ILO conventions define core labour standards as labour that: (a) is not child labour; (b) is not forced labour; (c) guarantees freedom of association and the right to collective bargaining, and promotes organization of rural workers; and (d) does not entail discrimination at work based on race, colour, sex, religion, political opinion, national extraction, social origin or other criteria.

strengthening their active participation in professional organizations and decision-making have all proven to be effective ways of increasing productivity in the sector, improving livelihoods and protecting biodiversity while ensuring food security and sustainable forest management (FAO, 2022c).

Youth inclusion, as highlighted in the Youth Call for Action (YCA), recognizes that youth[17] constitute a large part of the world's population and are well placed for the invention and development of new forms of action and activism, with the potential to generate effective responses to issues of concern (FAO, 2022d). Youth and young professionals interested in working for and contributing expertise to the forest sector, can advance innovative ideas and provide critical ambition and skills to take up the global challenge of halting deforestation and forest degradation and promoting sustainable forest management. Meaningful reforms in sustainable forest management, and in building a green, healthy and resilient future with forests, can only be successful with the full engagement of all stakeholders, and young people in particular.

4.3 ASSESSING ENVIRONMENTAL SUSTAINABILITY

This part of the sustainability assessment looks at the value chain's impacts on the natural environment and categorizes these impacts according to severity. The analysis identifies critical areas (hotspots) that may require more in-depth measurement and analysis at a later stage. The following environmental categories are examined: (1) forest sustainability; (2) climate; (3) biodiversity; (4) water and soil; (5) and waste and pollution. Additional categories can be considered, depending on local circumstances. For each category, several indicators need to be measured and discussed to assess environmental sustainability.

[17] Here, for consistency with the YCA, youth refer to persons between the ages of 15 and 40, in order to include young professionals working for and contributing to the forest sector.

TABLE 3

Examples of environmental sustainability categories and indicators

Categories	Examples of indicators
Forest sustainability	Sustainable production and harvesting Rate of deforestation and forest conversion Cascading use of forest products, share of materials reused or recycled
Climate impact	Net GHG emissions along the value chain Carbon stocks in forest assets Carbon stored in long-term wood products Renewable, clean energy use and consumption (%)
Biodiversity	Forest management systems and their impacts on biodiversity Planted forest impacts on biodiversity Forest degradation
Water and soil footprint	Water consumption Water pollution or purification Impacts on groundwater levels Impacts on soil protection or erosion control
Forest product loss	Wood and non-wood losses (share) – for example due to rotting or inefficiencies
Waste and pollution	Use of chemicals (e.g. fertilizers, pesticides) along the value chain Industrial waste Solid waste pollution

Source: Adapted from FAO & UNIDO. 2024. Developing sustainable food value chains – Practical guidance for systems-based analysis and design. SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

Note: GHG: greenhouse gas.

Below is a short explanation of what these categories are, and why they are relevant for assessing the environmental sustainability of the value chain.

Forest sustainability is critical to ensuring that forests supply goods and services meeting both present-day and future needs and contributing to the sustainable development of communities. For the purposes of assessing the sustainability of a given value chain, it is important that the level of extraction or harvest does not deplete (and will ideally improve) the forest asset. This is supported by the use of sustainable forest management[18] plans (FAO, 2024c).

[18] Sustainable forest management encompasses the administrative, legal, technical, economic, social and environmental aspects of the conservation and use of forests. It implies various degrees of human intervention, ranging from actions aimed at safeguarding and maintaining forest ecosystems and their functions, to those favouring specific socially or economically valuable species or groups of species for the improved production of goods and services, including important ecosystem services, such as carbon sequestration, biodiversity conservation, and the protection of water resources.

Forest-based value chains can have positive **climate impacts**. Protected, restored and sustainably managed forests do more than store and sequester carbon. They help regulate rainfall, stabilize the local and regional climate, and minimize extreme weather (FAO, 2024d)inclusive, resilient and sustainable agrifood systems and for achieving global goals such as the eradication of hunger and poverty and the sustainable management and use of natural resources.But innovation does not arise in a vacuum. Among other things, it requires enabling policies; strong, transformative partnerships; investment; an inclusive culture that is open to and encouraging of new ideas; and a willingness to take calculated risks. This edition of The State of the World's Forests (SOFO, which enhances the adaptive capacity and resilience of people and ecosystems. Sustainable forest-based value chains can also help support the transition to carbon neutrality (FAO, 2022e), including through sustainable wood production, reduced emissions in transport and processing, and more efficient, cleaner and greener forest-based bioenergy.

Forest **biodiversity** includes all forms of life found within forested areas and the ecological roles that these forest organisms play. Prospects for sustainable development will be largely influenced by the state of diversity of forest ecosystems and species. Forest ecosystems deliver a range of benefits that extend far beyond the provision of the essential forest goods that people rely on.

Healthy forest ecosystems produce and conserve **soil** and stabilize stream flows and **water** runoff – preventing land degradation and desertification and reducing the risks of natural disasters, such as droughts, floods and landslides. Forest ecosystem services are of particular importance for poor and vulnerable communities. The structure and functioning of value chains can influence how the production process will affect biodiversity, soil health and water resources.

A circular economy is based on the principles of efficient use of raw materials, including the use of residues as well as the reuse of products at the end of their lifecycle (FAO and UNECE, 2021; Korhonen *et al.*, 2018). This approach minimizes **forest product loss**, thereby keeping products and materials in use and regenerating natural systems, and maintains the value of products and materials for as long as possible by returning them to the product cycle at the end of their use, and minimizing the generation of **waste and pollution** (FAO, 2024e).

Selected tools for assessing sustainability

FAO's Value Chain Analysis Tool (VCA Tool) is a flexible software package that allows the value chain analysis (VCA) team to systematically organize and integrate the physical quantity and financial data collected into a combination of products, activities at actors and aggregated levels. The software maps the baseline scenario (current situation) at both market prices and reference prices, from which all economic sustainability indicators are calculated. FAO's VCA Tool can be used to conduct the economic sustainability assessment. The tool also feeds into the development of an upgrading strategy for the value chain, as it allows for an *ex ante* analysis of the socioeconomic effects of different upgrading options. The tool can be downloaded here: https://www.fao.org/sustainable-food-value-chains/training-and-learning-center/details/en/c/327855/.

The EX-Ante Carbon-balance Tool for value chains (EX-ACT VC: https://www.fao.org/in-action/epic/ex-act-tool/suite-of-tools/ex-act-vc/en/) is an Excel-based tool to analyse greenhouse gas (GHG) fluxes along the value chain. The tool can help with identifying potential entry points for socioeconomic improvements at each stage of the value chain. It can also be used to calculate the operating accounts of each actor (revenues and costs of inputs, labour and capital, and other costs). Its socioeconomic tab can be used to calculate gross production value; gross and net value added; net income; number of jobs created along the value chain; and women and youth participation. More information can be accessed here: EX-ACT VC | Economic and Policy Analysis of Climate Change | Food and Agriculture Organization of the United Nations (fao.org).

4.4 ASSESSING RESILIENCE

Resilience is defined as the capacity of a forest value chain to continue generating and delivering value (forest products and services) in the face of abrupt or more gradual disruptions in supply or demand, through the recovery from unexpected shocks, the avoidance of tipping points, and adaptation to ongoing change. This includes anticipation, preparation and prevention, mitigation, absorption, adaptation and recovery. In a nutshell, resilience analysis looks at how economic, social and environmental sustainability, which relate to value chain performance under normal circumstances, are affected by shocks. When resilience declines, a system moves closer to its critical thresholds and, consequently, disturbances have larger effects on the system[19] (IPCC, 2012; Vroegindewey and Hodbod, 2018).

The economic, social and environmental resilience of the value chain are interlinked. For example, economically resilient value chains enable improved social outcomes. Conversely, socially and environmentally resilient value chains are good for economic resilience. Resilience can be influenced by the structural attributes of the value chain, such as redundancy (duplication of critical functions or components), diversity and connectivity (including the "length" of the value chain). For example, local value

[19] When assessing the impact of a shock (e.g. the COVID pandemic), three phases can be distinguished (Sarker and Lester, 2019): the disruptive phase, the recovery phase and the new normal phase. During the disruptive phase, it is important to minimize the short-term impact on vulnerable groups. The recovery phase is critical for long-term impact. The new normal for the value change can be associated with a worse, similar or better sustainability performance, depending on the nature of the recovery process. It is therefore important to evaluate how the shock can be used for positive transformational change.

chains using local resources and serving local markets and needs, proved more resilient when confronted with the disruptions caused by the COVID pandemic (Marusak *et al.* 2021). Value chains that depended on travel or transport exhibited higher vulnerability. Looking at value chains from a resilience perspective can lead to prioritizing some value chains over others.

To assess the resilience of a forest-based value chain, FAO (2023c) suggests looking at different value chain capacities and actors in five major areas:

- **Anticipating shocks**

  Where possible, this may involve establishing early warning systems and taking pre-emptive action to avoid or reduce the potential negative impacts of shocks, as well as sharing information along the value chain and increasing transparency and collaboration. Access to and uptake of digital technology, and the adoption of responsible business conduct principles are also helpful aspects to consider in the assessment.

- **Reducing exposure and vulnerability**

  Examples of responses to shocks and stresses that reduce existing risks and avoid creating new ones include the diversification of production systems by planting native trees in planted forests or crop fields, or engaging in the maintenance of forest conservation areas or restoration interventions that improve the resilience of areas under intensive production. The ability to save and invest also increases resilience, as does the existence of "safety nets" and social protection measures.

- **Absorbing shocks**

  Measures that reduce exposure and vulnerability also improve the ability to absorb shocks. Besides the measures mentioned in the previous point, redundancy (the duplication of critical components and functions) can act as a form of insurance, which guarantees continued functioning in case of unexpected shocks. For example, a manufacturing facility might source some of its raw material from communities or small producers as a way of diversifying its sources of inputs and creating redundancy. This may make sense even if the communities supply raw material at slightly higher costs. Trade barriers (e.g. obstacles and delays in obtaining export permits) can have a disruptive effect on value chains, and governments should aim to remove them to ensure the smooth functioning of international transport and customs. Access to short-term financing (including cash transfers) may also be critical to avoid value chain collapse.

- **Enabling adaptation**

  Collaboration, information sharing and governance are functional attributes of the value chain that are critical to enable adaptation. Participation and inclusion ensure that multiple voices and ideas are heard about how to respond to shocks.

- **Innovation**

  The ability to transform a crisis into an opportunity for positive transformation is also key to improve resilience. Examples include investments in online platforms, e-commerce, innovative ICT applications and innovative marketing. A crisis

TABLE 4

Resilience attributes	
Structural attributes	**Functional and behavioural attributes**
Redundancy	Collaboration and governance
Diversity	Learning and adaptation
Connectivity	Participation and inclusion

can also be an opportunity to address governance issues otherwise difficult to tackle. The level of innovation and investment in research and development can be an important aspect to consider for the resilience assessment.

A resilience assessment can be summarized with a qualitative score assigned to six resilience attributes of the value chain (FAO and UNIDO, 2024).[20]

4.5 HEAT MAP

FAO and UNIDO (2024) suggest summarizing the results from the sustainability assessments in a heat map that rates sustainability as one of three levels:

- **Red** indicates a high concern area, or a highly unsustainable situation that requires attention in the immediate term, or an area whose resolution is complex (of dubious feasibility).
- **Yellow** indicates that there is a concern in terms of sustainability that needs to be addressed in the medium term and that can be resolved given sufficient resources and willingness.
- **Green** indicates that there are no significant sustainability concerns.

If they exist, benchmarks and quantitative information can be used by the stakeholders to indicate the level of concern and its corresponding colour. Otherwise, the level of concern can be assigned through a combination of stakeholder dialogue and discussion, and expert judgment if required. The heat map provides a visual summary of how the value chain is performing across sustainability dimensions and informs the prioritization of the sustainability aspects that should receive the most attention and interventions. The map can also be useful to advocate with partners about the areas where they could intervene. Below is a hypothetical heat map of a wood product value chain sourcing raw material from planted forests in East Africa. The map includes indicators for economic, social and environmental sustainability, and resilience. This heat map also includes a summary of the governance analysis, which, even if not part of the sustainability assessment, is key to understanding how the value chain is currently functioning.

[20] Attributes such as diversity and governance are commonly identified as key resilience aspects for improving agricultural value chains.

Finance and investment decisions increasingly take into account their impact on governance practices, besides their impact on the environmental and social aspects. There is a growing literature on environmental, social and governance (ESG) investing and ESG factors.

TABLE 5

Hypothetical heat map for a wood value chain with sample indicators

Economic sustainability	Social sustainability	Environmental sustainability	Governance	Resilience
Profitability	Inclusiveness/ socioeconomics	Forest sustainability	Vertical linkages	Structural
Revenues	Wages and employment distribution	Sustainable production/ harvesting	Policy, regulations, and standards	Redundancy
Operational costs	Value added distribution	Rate of deforestation/forest conversion	Access to information	Diversity
Capital expenditures	Poverty and vulnerability among VC actors	Cascading use of forest products/Share of materials re-used or recycled	Coordination of transaction	Connectivity
Net income	Discrimination	Climate impact	Access to finance	Behavioural
Return on investments	Decent employment	Net carbon emissions	Horizontal linkages	Collaboration and governance
Employment	Employment diversity and inclusion	Carbon stock in forest assets	Collective action	Participation and inclusion
Job creation (by VC actor)	Fair labor practices and working conditions	Renewable clean energy use/consumption (%)	Economies of scale or scope (aggregation)	Learning and adaptation
Number of household in forest production	Formalization of jobs (share)	Carbon stored in long term wood products	Presence of leaders for the various VC actor types	
Average wages paid (by type)	Job safety and security	Biodiversity	Market power	
Impacts on national economies	Job attractiveness	Forest management systems and impact on biodiversity	Asymmetries in size, knowledge, access to regulators or finance	
Fiscal revenues	Gender equality	Planted forests impacts on biodiversity	Dependencies on certain actors for critical inputs, finance or market access	
Export earnings	Women's economic involvement	Forest degradation	Competitors	
International competitiveness	Gendered division of labour	Water and soil footprint	Trust	
Trade balance of forest products	Gendered access to land and other assets	Water consumption	Incidence of cheating, corruption, non-payment: mechanisms to address it	
Comparative advantages/ disadvantages	Women's role in decision-making and leadership	Water pollution/purification	Cultural factors	
Cost structure compared to international industry benchmarks	Food security, safety, and nutrition	Impact on ground water levels	Presence of formal dispute resolution mechanisms	
Business environment/ attractiveness of investments	Availability and accessibility of food	Impacts on soil protection/ erosion control	Social capital	
	Utilization and stability of food	Waste and pollution	Social cohesion	
	Youth Inclusion	Use of chemical fertilizers, pesticides in production	Cultural traditions	
	Youth employment rate and entrepreneurship	Wood waste (share)		
	Training and skill development	Industrial waste		
	Youth representation in decision-making	Solid waste poll		

Selected tools for assessing sustainability

- The sustainability assessment aims to comprehensively analyse the economic, social and environmental performance of the value chain.
- The assessment covers economic, social, environmental and resilience aspects, which can be summarized in a heat map illustrating the overall sustainability performance.
- The economic assessment focuses on profitability, value added, employment generation, effects on the national economy, international competitiveness, and value for consumers (domestic).
- Value added is a central metric, encompassing wages, profits, taxes, interest, depreciation and rent. Understanding value added highlights where and how value is created and distributed within the value chain, emphasizing its significance for economic assessment.
- The social assessment evaluates both positive and negative impacts across core social categories, like inclusiveness, employment quality, gender equality, and social and cultural capital. It aims to assess the value chain's contributions to social well-being and equity.
- Environmental impacts are categorized and assessed in terms of severity, focusing on forest sustainability, climate, biodiversity, water and soil, waste and pollution, and the bioeconomy. The analysis identifies critical areas requiring further investigation and intervention for environmental sustainability.
- Resilience measures the value chain's capacity to continue functioning despite disruptions. It encompasses anticipating shocks, reducing exposure and vulnerability, absorbing shocks, enabling adaptation, and fostering innovation. A resilience assessment can be summarized as a qualitative score assigned to two main resilience attributes, namely structural attributes (i.e. redundancy, diversity, connectivity), and functional and behavioural attributes (i.e. collaboration and governance, learning and adaptation, participation and inclusion).
- Economic, social and environmental resilience aspects are interconnected. For instance, economically resilient value chains often lead to improved social outcomes, while socially and environmentally resilient value chains enhance economic resilience.
- A heat map can help summarize the results and indicate critical issue areas.

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United Republic of Tanzania - Forest ranger taking measurements of a tree.

Ghana - Workshop in Kumasi.

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CHAPTER 5

Designing value chain upgrading interventions

5. DESIGNING VALUE CHAIN UPGRADING INTERVENTIONS

The previous analyses produced assessments of how the forest-based value chain is currently working and identified critical sustainability issues. They may have identified segments where performance is good as well as areas that are problematic.

Informed by these analyses, the next step is to identify possible improvements in the value chain **structure**, which in turn lead to **changes in the behaviours** and interactions of value chain actors, and hence, **value chain performance**, such as related to the creation and equitable distribution of value within the chain.

This is a participatory process in which stakeholders evaluate the current situation and devise an upgraded value chain that better serves their long-term needs and opportunities. The aim of the process is to identify and select appropriate upgrading interventions, and then design a plan to implement them.

To inform the process, participants may choose to apply a strengths, weaknesses, opportunities and threats (SWOT) analysis and develop a theory of change to clearly articulate the expected sustainability impacts of the upgraded value chain and the change pathway to get there. A brief introduction to these tools can be found in FAO and UNIDO (2024).

The selection of the upgrading interventions will depend on the local context and on the objectives of the various actors involved in the value chain (e.g. value chain actors, governments), which may differ. Development partners can play a convening role and facilitate discussions and agreements towards a shared vision and how to achieve it.

Upgrading interventions may focus on transforming business models (enterprises increase scale, make better products, adopt new technologies, change business processes, engage with other partners, and find innovative ways to access markets), improving the enabling environment (e.g. policy, legal or regulatory change, public investment, government capacity building), and enhancing value chain governance (e.g. improving availability and accessibility of market data, small producers organizing to negotiate better prices) (FAO and UNIDO, 2024).

What is important is that the interventions activate a positive feedback loop, in the sense that the change is not dependent on continuing project support to be maintained. When implemented through projects, the activities should promote a new dynamic in the system that continues after the project.

5.1 TYPICAL UPGRADING INTERVENTIONS

Typical upgrading interventions that can be considered for forest-based value chains are mentioned below. Multiple interventions are generally implemented together. The upgrading interventions may be achieved by removing constraints, by changing the set of incentives and disincentives faced by the value chain actors, or both these things.

Interventions should catalyse a system-wide shift in value chain functioning and performing by addressing a critical constraint or bottleneck, modifying incentives

and disincentives, producing a needed demonstration effect, or transforming business models and practices.

- **Expansion and improvement of forest assets** (see Example 1). Expansion and improvement of forest assets may be needed to reach a point where raw material supply is sufficient to justify investments in improved processing facilities. Interventions needed in this area will depend on the current state of forest resources in the country. There are forest-rich countries where sustainable forest management for production can be applied in natural forests, and countries where natural forests have been largely lost due to deforestation and forest degradation, and where the focus is on conservation, restoration and reforestation. Most of the countries fall between these two extremes, meaning that there is a need for investments both in conserving and sustainably using natural forests and in restoration and reforestation. Securing finance for investments in production assets requires tenure rights to be secure.

  Typical areas that may need expansion or upgrading, or both, include:

  - plantation development, including with communities and smallholders, considering regimes that favour diversity, resilience and long rotations as well as company plantation development with outgrower schemes, and development of agroforestry systems;
  - restoration of degraded forest lands, including smallholder and farmer schemes and large-scale restoration on public and private lands;
  - sustainable management for production in natural forests (which may take the form of company or community concessions,[21] whereby the state and the private sector find ways to cooperate in order to advance both economic and environmental goals – see Example 2); and
  - different combinations of reforestation, restoration and conservation.

- **Investments in value-added processing facilities** (see Examples 2, 6 and 8). Investors seek opportunities for reasonable risk-adjusted returns from increased productivity and value addition. In practice, this means investing in the value chains that can use the wood raw material or NWFPs efficiently for multiple products that can be sold in lucrative markets. Investments in appropriate technologies are needed to increase productivity and efficiency, and to improve the competitive position in the markets. Such investments include:

  - investments in primary processing of solid wood products (e.g. sawmilling, kiln drying);
  - investments in secondary processing for final products (e.g. furniture, decking, flooring) and wood-based energy (e.g. wood-based bioenergy, sustainable charcoal, briquettes, pellets, energy cogeneration), including

[21] See examples in Mexico, Guatemala and Honduras, where Indigenous Peoples' and community forestry operations in the value chain are strengthened through increased investment and use of technical assistance (https://www.profor.info/knowledge/strengthening-value-chain-indigenous-and-community-forestry-operations).

processing for relatively new products (such as mass timber), veneer and plywood from small-diameter logs, and finger-jointing; and
    - pulp-based products (e.g. use of small dimensions and residues, textiles, insulation materials, biocomposites); and
    - NWFPs (e.g. shea butter, açaí berries).

- **Upgraded quality and standards.** Improvements in product quality and meeting standard specifications can be important aspects, with the potential to strengthen the value chain.
- **Upgraded non-financial services.** The competitiveness of value chains may depend on the availability and quality of support services. Strengthened services are key to access inputs, know-how and information. The value chain actors – namely smallholders, and SMEs engaged in transport, transformation, sales and financing – need support in information systems, human resources skills development, logistics, compliance with sustainability criteria and regulations, and access to markets and finance. Forest resource assessments, market outlooks, forest information systems, and modalities to support market access (e.g. trade promotion fairs) are all services that can support the strengthening of the value chain.
- **Upgraded financial services and instruments** (see Example 3 below). Finance is critical for value chain development. Financing can be provided by the formal financial sector (financial institutions), informal institutions, or by other value chain actors. The development of appropriate financing instruments (e.g. a new loan product), the creation of a guarantee scheme involving different partners to de-risk loans, modalities to collateralize loans with trees (Starfinger, Tham and Tegegne, 2023), or the organization of small actors into groups to apply for loans, may be key interventions for upgrading the value chain. Improving local financial institutions' knowledge of the forest sector (to lower risk perception), their capacities to administer special funds (e.g. fund management, due diligence procedures, compliance with sustainability criteria) or their accessibility to development finance institutions (DFIs) that use local intermediaries to channel finance for small-scale beneficiaries, may also be promising upgrading strategies.
- **Upgraded business linkages or clustering, or both**[22] (see Examples 7 and 9 below). Improving business linkages helps the coordination of operators along the value chain (e.g. Suriname proposal example). The creation and development

[22] USAID (2008) defines clusters as "a geographic concentration of interconnected businesses, suppliers and associated institutions creating direct and indirect synergies among them". USAID also comments that "a cluster approach can be a valuable mechanism to address value chain constraints, especially those requiring the transformation of stakeholder relationships..." and that "a cluster approach may be most effective in strengthening a value chain when: (1) the value chain is very unstructured throughout its segments (transportation, distribution, enabling environment), thus requiring intervention by numerous stakeholders who cannot resolve any single issue alone; (2) trust among stakeholders is weak and hence a special effort to create trust or 'social capital' is necessary; or (3) obstacles to objectives (i.e. increased sales) need to be addressed by multiple stakeholders and value chain segments."

of producer organizations (e.g. cooperatives) and industry associations also facilitate business linkages and the sharing of knowledge, know-how, business and market opportunities, and policy advocacy.

- **Improved investment readiness and bankability for forest-based value chain participants** (see Examples 4 and 9 below). Upgrading interventions may enhance the investment readiness and bankability of forest-based value chain participants, especially smallholders, communities, producer organizations, and micro-, small and medium-sized enterprises (MSMEs). Some of the interventions mentioned in other bullet points (e.g. strengthening producer organizations) can also improve their eligibility to access finance. Additional improvements may include:
  - improving capacity in commerce and creating bankable pipelines for DFIs and other financing sources;
  - supporting commercial capacities of producer organizations and SME associations (industry associations);
  - promoting gender equality, tenure rights, equal access to resources, training, knowledge and decision-making;
  - improving business management capacities using a model that can be sustained independently of continued project support;
  - enhancing understanding of the criteria needed for investments;
  - supporting partnerships between companies and smallholders (e.g. contracting and off-take agreements), considering fair distribution of benefits, costs and risks; and
  - mentoring organizations, cooperatives and MSMEs in their investment processes and business development.

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Mali - Workshop for wooden furniture.

TABLE 6

Pathways to increase the financial eligibility of value chain participants

Value chain participant	Support measures	Financial instruments	Examples of experiences
Smallholders/ farmers	Capacity building Business management Financial literacy Organizational development Assisting in access to finance Mentoring	Incentive schemes for restoration/reforestation	Uganda Sawlog Production Grant Scheme (SPGS)
Smallholder organizations		Applying revenue models with carbon/biodiversity offsets	Uganda ECOTRUST
		Microcredit schemes Mechanisms for internal financing	Kijani
Micro-sized enterprises		Company supply financing and client off-take contracts	Outgrower schemes
		Commercial loans with subsidized interests, guarantees, or both	SME finance
Small and medium-sized enterprises (SMEs)		Small equity from venture capital/private equity	World Resources Institute Land Accelerator, Africa Eats/Africa Trees
Industry associations	Partnerships		Suriname value chains

Table 6 provides some examples of support measures and possible financial instruments to use.

- **Upgraded governance and enabling environment** (see Example 5 below). An enabling business environment is a critical condition for sustainable economic development and is also essential for catalysing investments and finance for forest-based value chains. Many developing countries face challenges with governance, regulations, law enforcement, land tenure, infrastructure and human capacities, all of which impact the business environment. They affect resource use and market dynamics and power. Typical interventions that can enhance the business environment by improving vertical linkages include:
  - reducing and eliminating illegal or unsustainable practices (e.g. supporting and rewarding certification, developing traceability, assurance or verification systems for legal and sustainable products);
  - supporting and incentivizing the formalization of informal operators;
  - aligning policies, regulations, governance and application of the rule of law with socially and environmentally desirable activities;

- developing and implementing effective and predictable fiscal revenue collection systems;
- strengthening institutions such as certification bodies and national forestry authorities;
- reducing regional trade barriers and improvements in border efficiency and regional market integration; and
- allocating sufficient financial resources to maintain and improve the natural capital (healthy forest resources) and support sustainable forest-based value chains in line with the multiple values that they provide, including repurposing agricultural subsidies that damage natural ecosystems, providing financial institutions with tools and knowledge to increase investments in forest-based value chains, and designing blended finance solutions.

- **Improved infrastructure**. Without adequate infrastructure, business can be unfeasible or uncompetitive. Infrastructure development is also critical to enable trade across borders and through seaports. Investments in roads, railways and ports improve connectivity. Other improvements in the functioning of value chains can be achieved with investments in clean energy generation or cluster development, for example by equipping areas for industrial and business development with logistics access.

© Borin

Worker building a wooden house.

The following are selected examples of value chain upgrading interventions.

Example 1

Expansion and improvements in forest assets – Expanding planted forests in Uganda

Context

For decades, the Government of Uganda has worked to directly establish planted forests on public lands. The approach faced several challenges, including the lack of improved planting material, skills and information, and the lack of matching finance for continued forest management. In 1998, Uganda initiated forest sector reforms that gave the private sector a major role in developing and managing commercial forest plantations. The government was also tasked with creating a positive investment climate to encourage private investment in commercial forest plantations. Yet, initial incentives did not stimulate investments in commercial forestry.

However, in 2004, investments in quality planted forests took off when the European Union started to support private entities in establishing and developing tree plantations on government land leased to private actors through the Sawlog Production Grant Scheme (SPGS).

Largely thanks to this scheme, today Uganda has a significant forest plantation asset that stands as a foundation for several major wood product value chains. The scheme has encouraged a significant number of tree growers to join forces in the Uganda Tree Growers Association. The industrial processing capacities for primary and secondary processing are emerging but still insufficient to use the available plantation wood in a way that is efficient and adds value.

The upgrading intervention

Upgrading interventions included performance-based incentives for private individuals, smallholders and companies, such as matching grants covering 40 percent of the plantation establishment cost, seedling support to community tree planters, and capacity development in different topics. Critical to the success of the programme was the leasing of government land to private actors and the integrated nature of the support (simultaneously tackling multiple challenges affecting both primary production and processing). Close to 80 percent of the tree plantations were established on government land leased by private tree growers for a nominal fee. The public–private partnership, targeted grant support and capacity-development interventions promoted long-term investments by private entities in planted forests to provide raw material to fulfil a growing demand by the wood sector. This is now attracting investments in processing facilities, which, in turn, will potentially incentivize further planting. The SPGS has expanded the scope of value chain upgrading in the last phase of the programme, with demonstrations of wood processing, and business planning support in accessing finance to invest in value-added processing.

How the upgrade was financed

The plantation establishment was financed through EU grants (40 percent) and tree growers' own capital (60 percent). Key to the success of the initiative was also a "policy signal": the provision of public land at a nominal cost for plantation purposes. The processing demonstrations were financed with grants, while some business plans for processing received loans from local banks. Some well-established companies received financing from development finance institutions (DFIs) (in the form of debt and equity). Assessments are underway in support of further investments in processing units.

Takeaway lessons for replicating the approach in other contexts

- Finance came from multiple sources, including the tree growers' own capital.
- Public land leased at a nominal cost for plantation purposes can stimulate greenfield investments.
- Successful reforestation combined with restoration requires incentives and a conducive policy environment. The model of performance-based grants worked well and could be replicated elsewhere, where forest owners and managers have sufficient land areas with appropriate land tenure and that are suitable for sustainable reforestation and restoration.
- Markets for roundwood, and sufficient processing capacities, for example, are a key requirement for long-term success and expansion of additional financing from the private sector.

Sources:

FAO. 2021. *Assessment of the Ugandan commercial timber plantation resource and markets for its products.* Rome. https://openknowledge.fao.org/items/f3db7602-cea0-4e69-9bc3-41f2228827d6

Bedijo, N.B., Mapanda, W., Adata, M., Hitimana, L. & Obong, T.O. 2023. The Sawlog Production Grant Scheme: Uganda's flagship programme for inclusive commercial forestry. Unasylva 254, Vol. 73 2023/1. Rome. https://doi.org/10.4060/cc8584en

Example 2

Community concessions as pillars for improved forest management, value-added processing and conservation in the Maya Biosphere Reserve, Guatemala

Context

The Maya Biosphere Reserve was created in 1990 to protect the largest area of tropical forest in Central America. It occupies about 2.1 million hectares (ha), including 767 000 ha under strict protection, 848 400 ha under multiple use and 497 500 ha of private holdings in the buffer zone. The Guatemala peace process (1994–1996) resulted in the return to the area of farmer communities, with a consequent high risk of deforestation in the reserve. To reduce the risk of deforestation and provide the returning communities with alternative income-generating opportunities, communities were awarded conservation concessions.* Between 1994 and 2002, about 533 000 concessions were awarded in the multiple-use area with explicit conservation objectives (14 concessions in total, ranging in size from 2 ha to about 130 000 ha). Concessions currently cover 485 122 ha, as stated by Gretzinger in 2016 (cited by FAO and UNEP).

The upgrading intervention

The design features and the way in which the conservation concessions are awarded were important to the success and sustainability of the intervention. For example, certification by the Forest Stewardship Council (FSC) is a requirement for maintaining any concession. Certification has functioned as a mechanism for accountability and complements the monitoring performed by public institutions. The community concessions are managed in an integrated way for diversified uses, including collection of non-wood forest products (NWFPs) and tourism. However, the bulk of the revenues are from timber, especially high-value species such as mahogany (Swietenia macrophylla), as shown by Rodas and Stoian in 2015 (cited by FAO and UNEP). Overall, logging intensity is reported to be low in the community concessions. In 2012–2016, this was 0.7 m3/ha for mahogany (0.29 trees/ha) and 1.6 m3/ha overall, as indicated by Rodas and Stoian. The number of timber species harvested ranges from 4 to 19, with industrial concessions generally harvesting more species than community concessions. Results in terms of biodiversity conservation in the concessions include sustainable levels of timber harvesting, as demonstrated by Grogan *et al.* in 2016 (cited by FAO and UNEP), successful control of forest fires and reduced incidences of forest fires during El Niño and La Niña years, as shown by CONAP and WCS in 2018 (cited by FAO and UNEP), maintenance of jaguar populations, as indicated by Polisar *et al.* in 2016 (cited by FAO and UNEP), and low to zero deforestation, which resulted in a 0.1 percent increase in forest cover between 2016 and 2017, as shown by CONAP and WCS in 2018 (cited by FAO and UNEP). In contrast, deforestation in the core-zone protected areas (not included in the concessions) has been more variable, averaging about 1 percent, as demonstrated by Hodgdon *et al.* in 2015 (cited by FAO and UNEP).

The commercial viability of the concessions was further enhanced with investments in value-added processing (sawmilling) equipment and the establishment of a community enterprise (FORESCOM) that provides forestry services (e.g. processing, marketing) and products.

How the upgrade was financed

The development of the community concessions comprised grants, and technical assistance was initially financed from development partners. About one-third of the profits are reinvested in the forest through fire patrols and forest protection. The community concessions have also received loans from local banks to invest in value-added processing. Between 2012 and 2016, the community concessions earned about USD 25 million from timber sales. In concessions with more diversified production (wood and NWFPs) and greater capacity for value addition, the forest income of participating households was 1.6 to 2.8 times the poverty line, as shown by Stoian and Rodas in 2018 (cited by FAO and UNEP). Forest income (which represents approximately 38 percent of family income) plus the social services provided by the concessions, such as scholarships and health care, have helped to reduce emigration. On average, remittances in the concession areas contribute only 2 percent of family income, as shown by Stoian *et al.* in 2018 (cited by FAO and UNEP). Communities can access finance through banks that accept the annual operating plan as collateral. Many communities finance logging operations through upfront payments (with interest incorporated in the payment).

Takeaway lessons for replicating the approach in other contexts

- The awarding of concessions to communities with third-party certification requirements and the integration of conservation with community development led to outcomes that included increased incomes, reduced outmigration, enhanced employment opportunities, social investments, technical and administrative capacity building, and improved access to bank loans as a result of the concessionaires' increased creditworthiness.
- Concession management and certification requirements provided opportunities and motivation to strengthen the technical and administrative capacity of the community enterprises and also enabled communities to diversify forest income sources (timber, NWFPs, tourism), and reinvest profits in community projects and forest protection.

Note:

* Concessions are legal instruments that typically combine the granting of harvesting rights to non-state actors with the secondment of management responsibilities. See FAO & EFI. 2018. Making forest concessions in the tropics work to achieve the 2030 Agenda: Voluntary Guidelines. By Y.T. Tegegne, J. Van Brusselen, M. Cramm, T. Linhares-Juvenal, P. Pacheco, C. Sabogal and D. Tuomasjukka. FAO Forestry Paper No. 180. Rome. https://openknowledge.fao.org/items/b7dd2a28-148a-49f3-b2b8-2c56745778c4

Source: FAO & UNEP. 2020. *The State of the World's Forests 2020 – Forests, biodiversity and people.* Rome. https://doi.org/10.4060/ca8642en

Example 3

Financing restoration through selling carbon credits and integrating smallholders to value chains – Trees for Global Benefits and ECOTRUST, Uganda

Context

The Environmental Conservation Trust of Uganda (ECOTRUST) is a not-for-profit conservation organization established in Uganda in 1999 to conserve biological diversity and enhance social welfare by promoting innovative and sustainable environmental management. It started a Trees for Global Benefits (TGB) programme in 2003. The aim of this programme is to produce long-term, verifiable voluntary carbon emission reductions by combining carbon sequestration with livelihood improvements through small-scale, farmer-led forestry and agroforestry projects while reducing pressure on natural resources in national parks and forest reserves.

The upgrading intervention

The payments for ecosystem services (PES) model in TGB is designed to incentivize the transformation of smallholder investment horizons from short-term, hand-to-mouth seasonal plans to longer-term sustainable land-use and business plans, with funding from voluntary carbon markets.

Individual households contribute 0.5–1 hectare (ha) for planting woodlots for a rotational period of 25 years. They then make additional investments in planting and managing the woodlots (400 trees/ha) for a minimum of 10 years; green enterprises also help households sustain their income beyond carbon payments.

How the upgrade was financed

The mechanism delivers USD 6 of every USD 10 of carbon payments to local smallholder conservation farmers. It involves a blended finance model that combines public (donor) finance, private sector foreign direct investment, ECOTRUST's own internal revenues, and community contributions. As of 2021, the communities had committed (in the form of land and reforestation with native species) the equivalent of more than USD 27 million in reforestation and improved forest management under the TGB programme. The specifications under TGB have enabled the aggregation of carbon removals by over 12 000 smallholders under the Plan Vivo standard. For the last 17 years, these have been sold through ECOTRUST to national and international buyers in voluntary carbon. TGB's PES incentives revolve around making the adoption of agroforestry-based sustainable land use a viable livelihood option by ensuring the availability of a sustainable flow of financing at the different stages of the land-use enterprise. This is achieved through the creation of opportunities for smallholders to tap into multiple funding sources, including Village Savings and Loan Associations (VSLAs), savings and credit cooperatives (SACCOs) and the sale of carbon credits for agroforestry as a means of generating income and improving land management while contributing to biodiversity conservation and global climate benefits.

Takeaway lessons for replicating the approach in other contexts

The ECOTRUST model is an example of how voluntary carbon credits can enable smallholders to develop sustainable forest production systems integrated to value chains. Lessons include the importance of:

- Designing long-term PES models that transform smallholder investment horizons from short-term to sustainable land-use plans.
- Combining carbon sequestration with livelihood improvements through small-scale, farmer-led forestry or agroforestry projects that generate carbon credits for sale.
- Implementing a blended finance model using public, private, organizational and community contributions.
- Ensuring a significant portion of carbon payments (e.g. 60 percent) directly benefit local smallholder farmers.
- Developing mechanisms to aggregate carbon removals from many smallholders in order to access voluntary carbon markets.
- Creating opportunities for smallholders to access multiple funding sources for agroforestry initiatives.
- Integrating green enterprises to help sustain household income beyond carbon payments.
- Using established standards (e.g. Plan Vivo) to ensure credibility and marketability of carbon credits.
- Balancing global climate benefits with local biodiversity conservation and improved land management.
- Designing programmes that commit communities to long-term (e.g. 25-year) sustainable forest management practices.

Sources:

Byakagaba, P., Nantongo, P.K. & Kalibwani, F. 2021. Finance for integrated landscape management. De-risking smallholder farmer investments in integrated landscape management: ECOTRUST's Trees for Global Benefit (TGB) in Uganda. Kampala and Ede, The Netherlands, Environmental Conservation Trust of Uganda and Tropenbos International. https://hdl.handle.net/10568/115471

ECOTRUST. 2021. Trees for Global Benefits. In: *ECOTRUST*. [Cited 18 December 2024]. https://ecotrust.or.ug/trees-for-global-benefits/

Example 4

Integrating forest-based activities for sustainable impacts – Kilombero Valley Teak Company in the United Republic of Tanzania

Context

The Kilombero Valley Teak Company (KVTC) was established in 1992 in the United Republic of Tanzania as a teak plantation. It manages 28 000 hectares (ha) of land, with 30 percent dedicated to sustainable forestry and 70 percent under active conservation. KVTC is located between the Udzungwa National Park and the Selous Game Reserve, serving as a critical link between these biodiversity hotspots.

Diagonal teak wood planks.

The upgrading intervention

KVTC implemented a model of responsible forestry that combines commercial teak production with conservation efforts. Key aspects include:

- Planting 8 000 ha of teak while conserving 16 000 ha of natural forests and 4 000 ha of grasslands and wetlands.
- Establishing a state-of-the-art sawmill and processing facility for teak products.
- Implementing an outgrower support programme to help local farmers convert their land to teak forestry.
- Creating a mosaic layout of teak compartments and conservation land to allow wildlife passage.
- Employing village game scouts to monitor and protect wildlife and natural areas.

How the upgrade was financed

The intervention was primarily financed through long-term investments from socially and environmentally responsible investors. Initially established by the British Commonwealth Development Corporation (CDC), KVTC is now jointly owned by the Africa Sustainable Forestry Fund (ASFF) and the Finnish Fund for Industrial Cooperation Ltd (Finnfund). Over the first 25 years, shareholders invested over USD 50 million to establish the plantations and sawmill.

Takeaway lessons for replicating the approach in other contexts

The KVTC case is a successful example of long-term development with development financing. In order to create value addition, local benefits, and successful conservation and restoration of forest lands, it was important to:

- Adopt a long-term perspective: teak plantations require patient capital and take 25–30 years to mature.
- Balance commercial forestry with conservation: dedicate a significant portion of land to conservation efforts.
- Engage local communities: implement programmes like the outgrower support programme and employ local people as village game scouts.
- Invest in local infrastructure and social development: establish a social fund to support community projects.
- Integrate with the local economy: prioritize local hiring and procurement to maximize economic benefits.
- Implement sustainable practices: apply international standards like those of the Forest Stewardship Council.
- Create wildlife corridors: design the plantation layout to allow for wildlife movement and conservation.
- Diversify product offerings: develop various teak products to serve different markets.
- Collaborate with government and international partners: work with relevant authorities and development organizations to enhance impact.
- Monitor and adapt: regularly assess environmental and social impacts, adjusting strategies as needed.

Sources:

KVTC. 2018. *Creating value, conserving forests – Kilombero Valley Teak Company: a model for responsible forestry in Sub-Saharan Africa.* A publication for the twenty-fifth anniversary in 2018. https://www.criterionafrica.com/wp-content/uploads/2024/02/KVTC25yearsofImpact.pdf

KVTC. 2024. Kilombero Vallery Teak Company. In: *KVTC*. [Cited 19 December 2024]. https://www.kvtc.co.tz/

Example 5

Improvements in the business environment for certified practices in forest production – The modular taxation system in Gabon

Context

In 2020, Gabon developed a bonus/malus system to implement a green tax incentive: a zoning system was implemented that identified concessions with forest certification, those with legality certificates and those that were not certified. The system is based on zones having different tax rates, from the most advantageous for certified sustainable management zones to the least advantageous for non-certified zones.

The upgrading intervention

In Gabon, the Amending Finance Law 2020 introduced a differentiated forest tax (three levels) for forest concessions, depending on whether or not they are certified. Concessions certified through the Forest Stewardship Council (FSC) or the Pan-African Forest Certification (PAFC) schemes benefited from a reduction in the area tax (XAF 300/ha per year instead of XAF 400/ha per year under the previous tax regime). Concessions with legality certification had a moderate tax increase (XAF 600/ha per year). Non-certified concessions saw their tax double to XAF 800/ha per year. In 2024, this rate was increased to XAF 1 000 for non-certified concessions. This change in taxation incentivizes sustainable forest management while possibly increasing overall tax revenues.

How the upgrade was financed

The bonus/malus mechanism is designed to be self-financing:

- The increased taxes (malus) on non-sustainable production generate additional revenue.
- This additional revenue is used to finance the tax reductions (bonus) for sustainable production.
- The system aims for budget neutrality, preventing any tax loss for the state.
- The mechanism can be calibrated to increase overall tax revenue.

Development partners could provide a "zero net fiscal loss" financial facility to guarantee against potential budget gaps due to forecasting inaccuracies.

The Amending Finance Law provided the legal framework for implementing this new tax structure, allowing for its integration into the national fiscal system.

Takeaway lessons for replicating the approach in other contexts

A change in taxation regime can send a powerful signal to help transition forest practices towards sustainability. To achieve this, it is important to:

- Use legislative tools like the Amending Finance Law to provide a legal basis for implementation.
- Design a tiered system that rewards different levels of sustainability certification.
- Consider gradual tax increases for non-certified operations to encourage behaviour change.
- Align the mechanism with national goals for both sustainable resource management and revenue generation.
- Monitor the impact on certification uptake and adjust rates as needed.
- Ensure transparency in rate changes and their rationale.
- Consider the unique characteristics of the sector and local context when designing the system.
- Regularly review and adjust the mechanism to maintain its effectiveness over time.

Sources:

Karsenty, A. & Salau, S. 2023. Fiscal incentives for improved forest management and deforestation-free agricultural commodities in Central and West Africa. *International Forestry Review*, 25(1): 27–38. https://doi.org/10.1505/146554823836838691

ATIBT. 2024. Ecological taxation: How can a tax bonus-malus mechanism be implemented? In: *ATIBT*. [Cited 19 December 2024]. https://www.atibt.org/en/news/13473/ecological-taxation-how-can-a-tax-bonus-malus-mechanism-be-implementedquestion

Example 6

Investment in processing for the shea nut industry in Mali

Context

Mali is the world's second-largest producer of shea nuts, accounting for approximately 20 percent of the global shea supply. Shea butter is used as a cocoa butter equivalent in the cosmetics and food industries. But a lack of technology and modern industrial equipment means that Mali produces virtually no industrial shea butter. In Mali, shea nuts are usually sold raw or processed locally into low-quality artisanal shea butter, keeping the country on the fringes of the lucrative and fast-growing industrial shea butter market. For a conflict-stricken country like Mali, where over 42 percent of the population live in poverty, this is an opportunity lost – especially for the approximately 1 million mostly poor rural women who work in the shea value chain.

Shea nut and butter.

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The upgrading intervention

The intervention involved building the first active modern shea butter processing plant in Mali through Mali Shi, a shea nut processing company based near Bamako. This plant will enable local processing of shea nuts into industrial-grade shea butter, increasing incomes for the 120 000 shea producers who supply nuts to the company. Over 95 percent of these producers are women, for whom the secure income is critical, as it pays school fees for children, and household expenses.

Additionally, the project includes:

- training in business skills, finance and management for members of 100 women-led cooperatives working with Mali Shi;
- improving the company's energy efficiency, and environmental and social management; and
- enhancing product traceability and applying international food safety standards.

How the upgrade was financed

The International Finance Corporation (IFC) and the Private Sector Window of the Global Agriculture and Food Security Program (GAFSP) are providing a loan of EUR 2.5 million to Mali Shi – a shea nut processing company based on the outskirts of Bamako.

Takeaway lessons for replicating the approach in other contexts

To upgrade the non-wood forest product (NWFP) value chain with investments in local processing, it was important to:

- Identify and leverage local agricultural strengths and opportunities (in this case, shea nut production).
- Focus on value addition through local processing to capture more of the product's value chain.
- Target interventions that benefit vulnerable populations, especially women in rural areas.
- Combine financial support with technical assistance to ensure project success.
- Address multiple aspects of development simultaneously (e.g. economic growth, women's empowerment, food safety standards).
- Partner with international organizations to access both funding and expertise.
- Prioritize projects that can have a significant impact on local livelihoods and the national economy.
- Ensure interventions meet international quality and safety standards to access global markets.

Source: GAFSP. 2024. Mali's Shea Nut Industry Takes Root. In: *GAFSP*. [Cited 19 December 2024]. https://www.gafspfund.org/projects/malis-shea-nut-industry-takes-root

Example 7

Enhancing efficiency and competitiveness through business clustering – A proposal by the Suriname Trade and Industry Association

Context

In the current "business-as-usual" set-up, Surinamese forest companies are generating about USD 140–200 million gross revenues and employment for 10 000 persons per year mainly from log exports. The current wood value chains comprise logging operators, roundwood exporters and local wood processing companies. The local processing companies rely on mainly old, small-scale technologies with low recovery rates (30–35 percent), meaning that large quantities of wood are wasted. The wood value chains have limited benefits for local stakeholders. The revenues could be increased with investments in value adding and more efficient use of wood without expanding logging volumes assuming that the industries become competitive and strengthen their market positions. The investments could also promote certified sustainable forest management applying reduced impact logging.

Suriname exports roundwood to countries worldwide.

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The upgrading intervention

The Suriname Trade and Industry Association (VSB) with FAO support assisted its members (15 companies) with a focus on wood processing, non-wood forest products and ecotourism to prepare business plans, which were finalized by the end of 2022.

The business plans were targeted to sustainable businesses that would value Surinamese forest resources. The investments targeted the processing of local wood into value-added products, the aim being to reduce roundwood exports to other countries, such as Asian countries, which then process the logs.

In addition, VSB is promoting the establishment of an industrial zone for wood production in Paramaribo in an optimal location from the point of view of transport logistics (from the forest to mill sites and from mill sites to the port of export), and access to energy. This kind of clustering can increase value addition. When several wood product companies are in the same geographic location, logistics for sourcing wood are more efficient, and the use of different wood assortments (species, sizes and qualities) for various products is easier. The companies can purchase and use raw materials in a more efficient way and increase yield. In addition, primary processing can provide wood residues in quantities that allow the production of panels or bioenergy. In addition to transport infrastructure, the companies also benefit from sharing energy solutions, support services and market access.

How the upgrade was financed

The VSB and its members received support from FAO in business planning. To implement these plans and the desired upgrades, the companies are trying to access finance from local banks and development finance institutions (DFIs).

Takeaway lessons for replicating the approach in other contexts

- The financing of the business plans as well as the establishment of the forest industry is on-going.
- Producers' and industry associations play a key role in promoting partnerships and overall value chain development.

Source: FAO. (forthcoming). Suriname Forest Finance Strategy.

Example 8

New products, new technologies and new markets – Promoting the use of engineered timber in the construction sector in Kenya

Context

The construction industry, particularly the use of concrete and steel in buildings, accounts for 10–13 percent of global greenhouse gas emissions. This includes "embodied carbon" from the extraction, manufacture, transport, use and disposal of construction materials. In Nairobi, Kenya, there is a need for more sustainable building practices to reduce carbon emissions in construction.

The upgrading intervention

BuildX, a startup operating in Nairobi, Kenya, is developing mass timber as a viable alternative to traditional construction materials. Mass timber products are engineered wood designed as high-strength and lightweight replacements for concrete and steel. The intervention includes:

1. Developing and promoting mass timber products for construction.
2. Building the first multiple-storey buildings with cross-laminated timber in Nairobi.
3. Establishing partnerships with agroforestry companies to provide a wood supply that includes sustainable pine certified through the Forest Stewardship Council (FSC). The arrangement brings the costs down for mass timber.

How the upgrade was financed

This is a fully private venture. However, the example could be scaled up with development finance.

Takeaway lessons for replicating the approach in other contexts

- Private sector initiatives in commercializing new products, new technologies and new markets are critical for success and scaling-up.
- Not all value chain upgrades are designed to increase profits or scale up a company. Some upgrades may be undertaken to "green" existing value chains.

Source: Engineering for Change. 2023. A Startup in Nairobi Cuts Carbon in Construction with Mass Timber. In: *Engineering For Change.* [Cited 20 December 2024]. https://live-e4c-website.pantheonsite.io/news/startup-nairobi-cuts-carbon-construction-mass-timber/

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BuildX, a Kenyan startup, pioneers mass timber construction in Nairobi for sustainability.

Example 9

Multistakeholder participation in organizing forest and farm smallholders – The Binh Minh Agroforestry Cooperative, Yen Bai Province, Viet Nam

Context

The Binh Minh Agroforestry Cooperative (BMAC) emerged in Yen Bai Province, Viet Nam, where smallholder forest farmers struggled to access markets and obtain fair prices for their timber. The forest sector was highly fragmented, with 1.4 million households managing small forest areas and supplying 4 500 wood processing companies. BMAC began as an informal group of 15 acacia growers in 2008.

The upgrading intervention

By 2017, BMAC had evolved from an informal group to a registered cooperative with 18 members. With support from the Forest and Farm Facility (FFF), a partnership between FAO, the International Union for Conservation of Nature (IUCN), the International Institute for Environment and Development (IIED) and Agricord, and implemented in Viet Nam by the Viet Nam Farmers Union (VNFU), BMAC improved its internal governance. Through training, BMAC also improved its capacities in market analysis, business skills and Forest Stewardship Council certification. The cooperative invested in sawmilling equipment, obtained FSC certification for their 60-hectare forest, and established an FSC Chain-of-Custody (CoC) certified sawmill with a capacity of 700 cubic metres (m3) per month. The intervention successfully connected BMAC with large buyers like Nam Dinh Forest Products Joint Stock Company (NAFOCO) and Hoa Phat, significantly improving their market position and promoting sustainable forest management.

How the upgrade was financed

The upgrade was financed through multiple sources: initial capital of VND 30–200 million contributed by seven members to invest in sawmilling equipment; investment from the Hoa Phat company in additional sawmilling equipment and in FSC-CoC certification; small grants from FFF for training and capacity building; and members' profits reinvested in expanding operations.

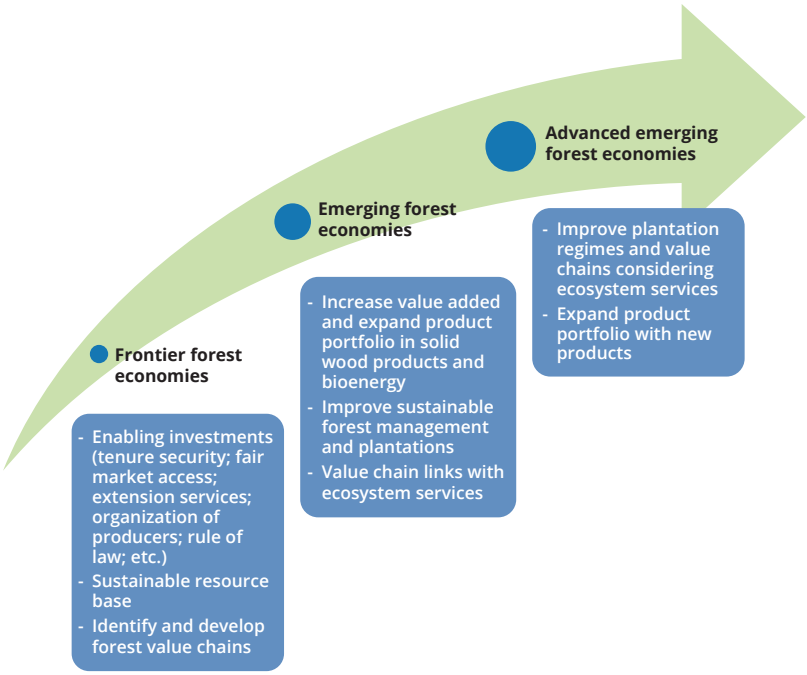
Takeaway lessons for replicating the approach in other contexts

- The success of BMAC demonstrates the importance of cooperation among civil society, farmers' organizations, businesses, financial institutions and government agencies. Each plays a complementary role in supporting smallholder organization and market integration.
- Providing comprehensive support during the start-up phase is crucial. This includes skills development, access to facilities, market information, policy guidance and technological support.
- Entities like the VNFU can serve as effective connectors and incubators for smallholder groups, providing sustained support even after project cycles end. This can be financed by members' fees and services offered for pay.
- Forest and farm producer organizations (FFPOs) are more likely to succeed when they focus on clear economic benefits for members, rather than being solely politically or socially oriented.
- Government policies that favour cooperative development and sustainable forest management create an enabling environment for FFPO growth.
- Encouraging the transition to long-rotation plantations can increase domestic value-added forestry but requires addressing short-term financial challenges for farmers.
- Forest and farm producer organizations should aim to diversify products and services to reduce dependence on single buyers or markets, improving resilience. As FFPOs grow, they need to improve internal governance, expand membership and increase capital to sustain and expand their operations.
- Resolving land rights issues is crucial for smallholder participation in high value-added forestry production and certification schemes.

Source: Le, T.T.T., Vu, L.Y.V., Brunner, J., Grouwels, S., Duong, N.P. & Pham, T.T. 2022. *Multistakeholder participation in organising forest and farm smallholders: Case study of Binh Minh Agroforestry Cooperative, Yen Bai Province, Viet Nam.* IUCN. https://portals.iucn.org/library/node/49879

FIGURE 11

Investment opportunities and the state of the forest economy


Advanced emerging forest economies
Emerging forest economies
Frontier forest economies
- Improve plantation regimes and value chains considering ecosystem services
- Expand product portfolio with new products
- Increase value added and expand product portfolio in solid wood products and bioenergy
- Improve sustainable forest management and plantations
- Value chain links with ecosystem services
- Enabling investments (tenure security; fair market access; extension services; organization of producers; rule of law; etc.)
- Sustainable resource base
- Identify and develop forest value chains

5.2 PRIORITIZING VALUE CHAIN INTERVENTIONS

Prioritizing value chain development interventions greatly depends on the current state of the forest sector. International forest investors[23] commonly categorize target geographies as frontier, emerging and advanced forest economies depending on investment experience and the status of underlying conditions for value chain development. This categorization provides a broader context for enabling project developers and investors to choose the most appropriate investment strategies and risk mitigation measures given the specific country conditions. Figure 11 illustrates the investment approaches that are often the most appropriate for different development stages.

Frontier forest economies have had limited exposure to forest investments. They often have poor industrial infrastructure, limited practices in sustainable forest management and few existing planted forest assets, unsecure land tenure, and limited information on resources and markets. There are high levels of informality in the forest products market. These countries typically have limited investments in forest-based value chains. Key investments and actions are needed to create a conducive business environment,

[23] See for example Binkley, Stewart and Power (2020).

specifically in the areas of governance, rule of law, transparency, information systems as well as connectivity with infrastructure and support services. The main investment opportunity lies in developing a sustainable resource base through sustainable forest management and planted forests while gradually increasing value added in solid wood products and bioenergy.

Emerging forest economies have forest assets with some good forestry practices, ongoing investments in forestry and related value chains, levels of value addition that are still low, typically rapid urbanization with an increasing demand for forest products, emerging infrastructure, land tenure that is unclear but improving, and some information available on markets and assets. In these countries, there is an opportunity to improve the sustainable resource base with sustainable forest management and planted forests, and to increase value added and expand product portfolios in solid wood products, pulp-based products and bioenergy, as well as new products. The raw material for pulp-based products and bioenergy should be sourced from the residues of solid wood product industries.

More **advanced forest economies** are already driven by private investments, have relatively good forestry practices and industrial infrastructure in place, and export at least some high value-added wood products. However, there is still room for sustainability improvements in terms of land tenure, inclusive growth and sustainable forest management practices that combine the delivery of ecosystem services (e.g. carbon stocks, biodiversity, watershed and soil protection) with the sustainable production of timber as a raw material.

Frontier, emerging and advanced forest economies roughly correspond to low-income, middle-income and high-income countries as per the World Bank classification.[24]

5.3 VALUE CHAIN DEVELOPMENT PLAN

The value chain development plan presents how agreed-upon individual stakeholder contributions will lead to the realization of the vision. It has three main components: (i) the overall log frame for value chain upgrading; (ii) action and investment tables; and (iii) a risk analysis with a risk-mitigation strategy.

5.3.1 Log frame

An overall log frame for value chain upgrading comprises impacts, outcomes, outputs and activities with a results chain and indicators. An example of an illustrative log frame is presented in Table 7.

[24] See the New World Bank country classifications by income level: 2022–2023

TABLE 7

Hypothetical log frame

Impact	Impact indicator	Baseline	End-of-project target	Vision target	Assumptions
To enhance the sustainable contribution of forest resources to national inclusive economic growth and to global efforts to address sustainable production and consumption	Contribution of the forest sector to gross domestic product Carbon sequestration capacity of the forest cover (tonnes CO2-equivalent) Rate of deforestation of natural forests (%)				Description of external factors necessary to achieve and sustain the impact
Outcome	**Outcome indicator**	**Baseline**	**2025 target**	**2030 target**	**Assumptions (to achieve outcome)**
Increased inclusion, exports, value addition and job creation in the forest value chain	Annual value of exports Number of full-time equivalent (FTE) jobs in the core value chain (gender-disaggregated) Number of policy instruments adopted supporting inclusion in value chain development				
Outputs	**Output indicators**	**Baseline**	**2025 target**	**2030 target**	**Assumptions (to achieve outputs)**
Improvements to sustainable forest production	Number of partnerships or contractual agreements for restoration, reforestation and sustainable forest use Number of households getting an income from forest products (disaggregated by gender of the household head)				
Improvements to primary processing	Total investment in primary processing Number of jobs supported/ sustained				
Improvements to secondary processing and clustering	Total investment in secondary processing Number of (a) jobs supported/ sustained				
Small producers organized in an association	Number of members belonging to the association				
Increased value added in forest-based value chains	Value created by value chains Use of forest resources (wood and non-wood) for value-added production				

Source: Adapted from FAO & UNIDO. 2024. Developing sustainable food value chains – Practical guidance for systems-based analysis and design. SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

The indicators used in the log frame can also be used to track progress on the implementation of upgrading activities.

TABLE 8

Format for the action table

Outcome 1					
Outputs	Actions	Stakeholders involved	Costs (USD)	Cost types	Timing
Output 1.1 e.g. financial feasibility of investment in processing equipment known to actors	Action 1.1.1 Expert contracted to conduct feasibility study				
	Action 1.1.2 Workshop on feasibility study organized				
	Action 1.1.3				
Output 1.2	Action 1.2.1				
Output 1.3	...				
Outcome 2					
Outputs	Actions	Stakeholders involved	Costs (USD)	Cost types	Timing
Output 2.1	Action 2.1.1				
	Action 2.1.2				
	...				
Output 2.2	Action 2.2.1				
	...				
	...				

Source: Adapted from FAO & UNIDO. 2024. Developing sustainable food value chains – Practical guidance for systems-based analysis and design. SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

5.3.2 Action and investment tables

The value chain development **action table** (Table 8) lists all the actions that need to be implemented by the value chain stakeholders (both public and private) and, possibly, the development partners to generate the outcomes and outputs that are needed to realize the vision. Based on Table 7, a Gantt chart-type timeline can be put together on what needs to happen when, taking causal dependencies into account.

The **investment table** (Table 9) provides an overview of the investments needed to realize the vision and how these investments are expected to be financed. The table also illustrates how blended finance strategies can be applied to fund investment in the upgraded business models identified in the value chain strategy. This section of the value chain report also presents and discusses in some detail the financing mechanism, which can include loan products, matching grants, equity stakes, de-risking tools, and so on.

TABLE 9

Format for the investment and financing table

Investment activities	Financing amounts by source (USD)				Totals by activity
	Private investment (equity)	Public investment	Project support (and others)	Financing institutions (loans)	
Wood processing facility					
Improved inputs supply					
Infrastructure					
Facilitation, technical assistance					
…	…	…	…	…	…
Total by source					

Source: Adapted from FAO & UNIDO. 2024. *Developing sustainable food value chains – Practical guidance for systems-based analysis and design.* SFVC Methodological Brief. Rome and Vienna. https://doi.org/10.4060/cc9291en

Table 10 provides some "order of magnitude" figures regarding the size of investments that may be needed to expand the forest resource base, purchase processing equipment and improve infrastructure and support services.

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Brazil - Stacks of sawn wood products of a sawmill.

TABLE 10

Order of magnitude of investment needs

Investments	Order of magniture	Million (USD)	Financial instrument
Forest Resource Base/Forest Assets			
Natural forest concessions			
Company concessions	50 000 ha	5–10	Loans, equity
Community concessions	5 000 ha	1–5	Incentives, carbon offsets
Plantation development			
Company plantations	10 000 ha	10–15	Loans, equity
Smallholder plantations	1 000 ha	0.5–1	Incentives, supply finance
Forest restoration			
Public areas	100 000 ha	30–50	Carbon credits
Companies	10 000 ha	5–10	Loans, equity, carbon credits
Communities/smallholders	1 000 ha	0.2–1	Carbon offsets and other payments for ecosystem (PES) services
Value-added processing			
Harvesting systems	50–100 000 m^3	1–2	Local and international loans, equity
Wood processing			
Sawmilling	10–50 000 m^3	0.5–5	Local and international loans, equity, company finance
Veneer and plywood	20–80 000 m^3	1–5	Local and international loans, equity, company finance
Cross-laminated timber (CLT), laminated veneer lumber (LVL)	10–20 000 m^3	2–10	Local and international loans, equity, company finance
Reconstituted panels	50–100 000 m^3	10–40	Local and international loans, equity, company finance
Pellets, briquettes	10–50 000 m^3	1–5	Local and international loans, equity, company finance
Furniture workshops	Sales of USD 0.5–1 million	0.2–0.5	Local and international loans, equity, company finance
Timber housing	Sales of USD 1–5 million	0.5–2	Local and international loans, equity, company finance
Non-wood forest products			
Collection systems	10–50 tonnes	0.1–0.2	Microcredit, local loans
Domestication	500–1 000 ha	0.5–0.5	Microcredit, local loans
Processing, delivery	50–100 tonnes	0.5–1	Microcredit, local loans
Trading		0.5–1	Local loans
Infrastructure and support services			
Connectivity (transport)		50–200	Sovereign loans, green bonds
Capacity development		10–20	Sovereign loans, green bonds
Information systems		5–20	Sovereign loans, green bonds

Source: Authors' own elaboration (estimates).

In some cases, the upgrading strategy may require little to no investment, but political will or policy adjustments, business adaptations, or an agreement on product quality and standards.

5.3.3. Risk analysis and mitigation strategy

Risks are all those foreseeable situations or events that affect and challenge the ability of the planned business to reach its objectives. Risks can be classified in a number of ways, and they can also partly overlap. A common approach is to distinguish between: (i) internal risks, or risks that the business can control in some way, such as technical and operational risks, and human resources and management risks; (ii) external risks, or risks deriving from factors that the business cannot control, such as legal and institutional risks, economic and market risks, environmental and climate risks, and social risks; and (iii) risks related to the assumptions made in relation to the upgrading strategy. Table 11 summarizes the most common risk categories associated with forestry investments.

TABLE 11

Categorization of risks in forest investments and their mitigation

Risks			Mitigation measures
Internal risks	Technical and operational risks	Reliability of resource data (productive forest area, existing inventory data)	Resource assessments, forest information systems
		Reliability of yield data	Transparent measurement systems
		Product quality	Standardization, appropriate technologies
	Human resources and management risks	Management, staff turnover/ commitment	Capacity development, appropriate incentives
		Capacities, competencies	
		Controlling subcontractors	
External risks	Legal and institutional risks	Political risks	High-level support for improving governance
		Related reputational risks	
		Corruption and legality issues	
		Legal approvals and regulatory risks	
	Economic and market risks	Price volatility	Mix of products for different qualities/ markets
		Access to markets	Market intelligence
		Substitution, competition	
		Stability of funding flows	Financial management
		Global health risks (e.g. pandemics), conflicts	Health and safety standards Diversification
	Environmental and climate risks	Forest fires	Forest fire management
		Pests, insects, diseases	Diversity in species and consideration of resilient management regimes
		Wind, storms, snow, floods	
		Other climate change-related	
	Social risks	Conflicts with stakeholders	Stakeholder consultations
		Land governance risks	Land-use planning, efforts to settle land tenure issues
		Unclear property rights	
		Reputational issues	Company participation in land-use planning
		Human rights risks from inadequate consultation, consent	Stakeholder consultations

Some of these risks are external not only to the businesses but also to the value chain as well. These include risks associated with political stability, land tenure security, how clear and simple property registration procedures are, and the enforcement of property rights. For example, countries with a high likelihood of land grabbing or invasion, or conflict due to civil unrest or corruption, will struggle to attract responsible investors. Conversely, attractive external conditions exist where the government sets clear regulations and efficient processes for compliance, and enforces the rules on legal and sustainable timber evenly among international and domestic investors (Binkley, Stewart and Power, 2020). Regulations may cover a range of areas from natural resources protection, standards for timber harvesting and grading, creating a friendly environment for legal timber through strong government enforcement of timber certification standards and taxation, and requirements for obtaining timber export licenses. Financial investments are encouraged through "transparent, efficient and obviously necessary" regulations (Binkley, Stewart and Power, 2020; Castrén *et al.*, 2014; FAO and UNEP, 2020). Simplified regulations that remove needless hurdles and streamline processes can promote sustainable resource usage, wood processing and value-added product creation (FAO, 2022a).

Additional external risk factors include environmental aspects such as a changing climate that might cause unexpected shock effects like fire, drought, flooding or the unusual spread of pests and diseases. Examples of risks that are specific to the value chain include those associated with markets for forest products, the forest resource base, the capacities of organizations and human resources, infrastructure and technologies, opportunities for value added and increased productivity, and sustainability of the planned interventions.

To make good investments and mobilize financing, it is critical to identify and reduce risks, which requires actions by all stakeholders. Governments and development partners have a role in creating a conducive business environment, while financial institutions can develop instruments that share the risks. The operators and investors can develop bankable business plans that demonstrate the business model from different perspectives.

The assessment of risks is a fundamental part of financing decisions. In fact, in making investment decisions, the cost of capital investment is weighed up against the benefits. Many investors expect higher returns for investments made in developing countries than for those made in more developed countries, due to higher risk factors.

Key takeaway messages

- Transforming forest-based value chains requires a participatory approach. Stakeholders work together to assess current practices, identify areas for improvement, and design interventions that enhance sustainability across the entire chain (business models, enabling environment, governance).
- Sustainability is a shared journey. An approach that actively involves all stakeholders (forest users, producers, businesses, government) builds relationships and consensus, fosters local knowledge integration, and increases ownership for long-term success.
- A wide range of interventions for improving forest-based value chains can be considered, and several of them are often implemented together. These can include improvements to:
  - **upgrade the system:** invest in sustainable forest management, processing facilities and quality control, and enhance support services like market access and skills training for stakeholders;
  - **connect and empower:** improve access to finance and business linkages for smallholders and communities, and foster collaboration through producer organizations and industry associations; and
  - **strengthen the environment:** tackle illegal practices and support good governance, and enhance the enabling environment with sustainable policies, infrastructure investment and efficient financial systems.
- The prioritization of forestry investments depends on the current context and the maturity of the forest sector.
- A value chain development plan details which interventions will contribute to a more sustainable, competitive, inclusive and resilient value chain. It has three main components: (i) an overall log frame for value chain upgrading; (ii) action and investment tables; and (iii) a risk analysis with a mitigation strategy.

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Côte d'Ivoire - Small-scale timber processing.

South Africa - Mechanical harvester processing logs in a sustainable forestry operation.

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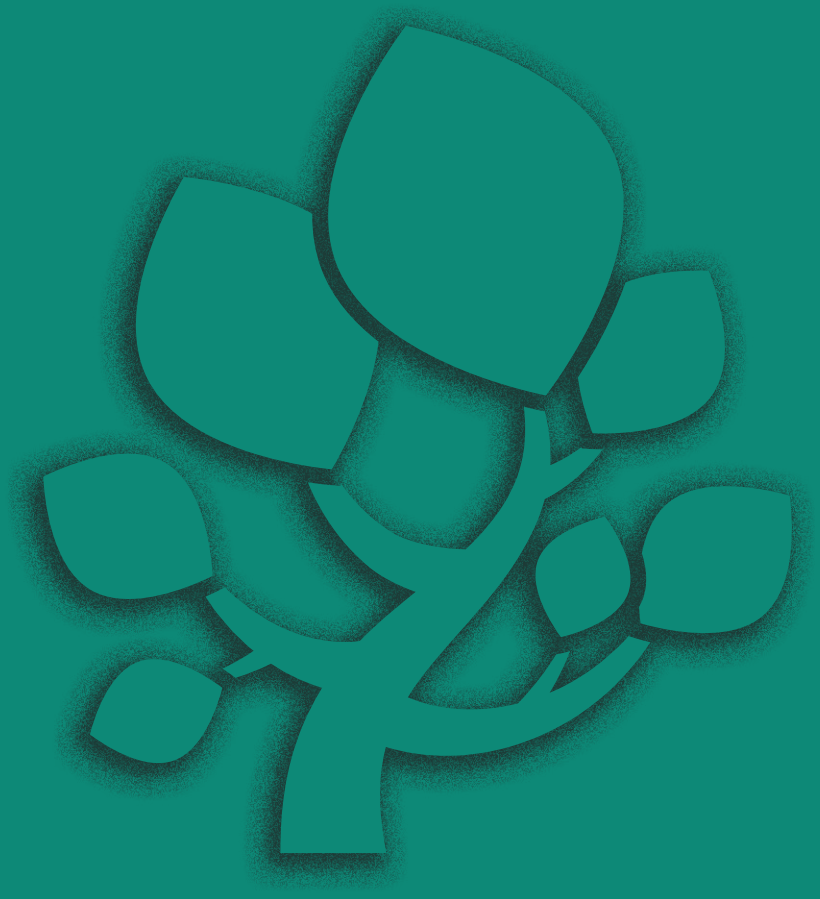
CHAPTER 6

Financing the upgrading of forest-based value chains



6. FINANCING THE UPGRADING OF FOREST-BASED VALUE CHAINS

Financing forest-based value chains in developing countries presents challenges. The overall level of finance directed to investments in forest-based value chains is limited and seldom reaches smallholders, microenterprises and small and medium-sized operators. Markets for forest ecosystem services like carbon sequestration and avoided emissions are growing but are still volatile and uncertain.

6.1 GAPS IN QUANTITY

It has been well documented that increased levels of finance and investment in forestry are urgently needed to counter climate change, biodiversity loss, anticipated shortages in forest products, and persistent poverty and inequality in many developing countries (FAO, 2022a; UNEP, 2022). UNEP (2022) estimated that the finance used for nature-based solutions[25] was USD 154 billion in 2022, obtained mainly from national and international public sources. The same source estimates that annual requirements from 2022 to 2050 to reverse the continuing deforestation, forest degradation and degradation of natural ecosystems are USD 400 billion per year (assuming a climate change scenario of 1.5 °C). Deutz *et al.* (2020) have reached estimates in the same range. Based on the estimates by UNEP and Deutz *et al.*, the share of forest-related nature-based solutions in current financing is about 30 percent (about USD 50 billion in 2022). When it comes to future needs, the same sources estimate that about 80 percent of finance for nature-based solutions should be directed towards forest-related actions such as reforestation, agroforestry, protected areas and avoided deforestation.

The financing of forests has traditionally come from public sources, which are far too limited compared to anticipated needs. New finance, both public and private, is expected to be generated from climate finance (motivated by a carbon market) and probably from biodiversity finance (motivated by conservation of biodiversity, dependencies on natural capital and biodiversity credits). This finance shows much promise and can improve the cash flow of forest-based businesses by adding important revenue sources, such as payments for carbon sequestration or reductions in GHG emissions (Criterion Africa Partners and Gatsby Africa, 2024), by providing income during years when products like wood are not yet mature, and by lowering risk levels

[25] Such nature-based solutions covered agriculture, forestry, fisheries, water resources, pollution abatement, biodiversity protection and environmental policy investments. IUCN defines nature-based solutions as actions to protect, sustainably manage and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature. A significant share of nature-based solutions are linked to forestry.

through income diversification. At the same time, markets for ecosystem services are still volatile and uncertain[26] (GEF, 2023; Greenfield, 2023).

Regardless of how markets for ecosystem services will develop, meeting the overwhelming amount of finance needed to transform forest-based value chains will require increased flows from multiple sources: international development partners, multilateral and national development banks, national governments, and the local and international private sector.

The private sector, which has the most significant expansion potential, is mostly driven by the commercial viability of products and services. To actualize this potential, different measures are needed by country governments to make the business environment more conducive for sustainable forest-based, and more broadly, nature-based enterprises and reduce risks for private financing. Support measures that enable inclusion of smallholder and microenterprises are also needed.

6.2 GAPS IN ACCESS TO AND ADEQUACY OF FINANCING INSTRUMENTS

In many developing countries, forest-based smallholders and communities, SMEs, women and youth, and Indigenous Peoples in particular, typically struggle to access finance. For example, it is estimated that only 1.7 percent of climate finance reaches smallholders and communities (Chiriac, Naran and Falconer, 2020). The reasons are manifold, and have to do with the transaction costs involved: for example, the costs of carrying out a due diligence process are justified only for large investments. In addition, there are perceived risks associated with lending to smallholders (Boscolo, Lehtonen and Pra, 2021; FAO, 2019; Louman *et al.*, 2022). These are:

- limited own capital and assets that can serve as collateral (due to lack of land titles, or the banks' criteria for the collateral), which reduces the ability to invest in new production systems and increase productivity, such as with new technologies;
- small size of assets and constrained scalability, which limits eligibility for international financing;
- weak organizational strength, bargaining power and access to markets;
- inadequate business management capacities and financial literacy; and
- the informal nature of many forest activities and the fragmentation of forest-based value chains.

[26] The scaling-up of carbon and biodiversity finance opportunities still poses several challenges, including:
- The verification of projects that claim emission reductions and assure integrity of carbon offset processes is still inconsistent and unaffordable for many producers.
- Biodiversity offsetting is in its early stages, and methodologies for verification are still under development.
- Meaningful impacts (e.g. in terms of GHG sequestered or biodiversity protected) require large areas for generating carbon stocks (or other ecosystem services) from forests.
- Carbon and biodiversity offsetting are relatively temporary solutions. In the long term, other sources of finance for ecosystem services are needed to ensure forest conservation and protection.
- Channelling finance to smallholders, communities and SMEs involves high transactions costs.

On the other hand, most financial institutions have limited understanding of the opportunities and needs of the businesses operating in forest-based value chains, do not know how to appraise funding requests, and offer inadequate financing solutions. For example, local banks typically offer short-term loans with high interest rates. A considered analysis of the value chain can help financial institutions understand the opportunities and needs of a specific forest-based business and motivate its financing.

Access to finance is also challenging for the "missing middle", which refers to SMEs too large to be served by microfinance institutions but too small to attract funding from banks or other investors (e.g. equity funds and institutional investors). At one extreme, a limited level of finance (most typically in the form of small loans or grants, usually not exceeding USD 100 000 and usually much less than that) reaches smallholders and their organizations thanks to the support of development agencies, non-governmental organizations (NGOs) and microfinance institutions. At the other end, commercial, concessional and blended finance (where debt and equity instruments can be combined with grants, guarantees and technical assistance) can be mobilized for initiatives and investments with a ticket size of several million United States dollars. There remains the "missing middle", meaning financing needs that fall roughly in the USD 100 000 to USD 1 million range, which are too large to be transferred as grants and too small to justify the design and implementation of a debt or blended finance instrument. Financing in this range is needed, for example, to acquire or upgrade technologies in wood and NWFP processing to increase productivity and value added, use raw materials more efficiently, scale up production, adopt systems ensuring transparency and the sustainability of raw material supply, and to make investments in infrastructure, among other things.

Businesses that fall within the "missing middle" are crucial links in the value chain. They often source raw material and services from smallholders and microenterprises, providing them with commercial opportunities and often improving their access to inputs, know-how and finance. It is therefore essential that finance solutions are found for the "missing middle".

A promising solution is to rely on adequate financial intermediation, whereby local financial institutions (e.g. local commercial banks, local development banks, cooperative banks, Village Savings and Loans Associations) act as intermediary providers of finance and other services, with funds that are made available by international and multinational finance providers.

6.3 OVERVIEW OF FINANCIAL INSTRUMENTS

As described in previous sections, access to finance for upgrading forest-based value chains remains a challenge, especially for smallholders and SMEs. Resolving this problem requires addressing gaps to reach the "missing middle", innovation, and collaboration and partnership among multiple financing sources, and combining multiple revenue streams (e.g. from the sale of products and carbon credits) and financial instruments with different terms (e.g. grants and loans). More work is needed to improve the quantity and quality of investable projects (or pipeline of bankable

projects) and increase the availability of adequate financing instruments that are fit for purpose.

The purpose of this section is to identify the financing sources and instruments that are currently available for upgrading value chains. Table 12 provides an overview of all available sources[27] that could potentially be accessed, and improved upon where necessary, and their relevance for upgrading forest-based value chains. It is good to note that availability of different sources and instruments may vary across countries and regions. Sources of finance include own capital, finance from family, the community or other value chain actors, international development agencies, government institutions, commercial banks, development banks, financial investors (institutional investors such as pension funds, family offices and different types of funds), impact investors, philanthropic organizations, and so on. These sources use different financial instruments, such as grants, loans and equity. These may also be offered as various blends.

TABLE 12

List of financing instruments and sources, and their relevance to forest-based value chains

Instruments	Source	Description	Relevance to forest-based value chains
Own capital	Own assets of producers, SMEs, companies or other organizations	Having one's own capital is the most important source of financing investments. The main reason why smallholders, small-scale forest operators, NWFP collectors and most small enterprises look for other sources of finance is lack of capital.	Without capital or some other form of collateral, it is almost impossible to receive any finance other than grants or subsidies.
Grants and subsidies	Government, development agencies, NGOs	Grants and a variety of subsidies are conventionally channelled through donor-financed projects. With the help of donor support, the role of the government in providing subsidies has been growing gradually. Grant financing is limited, and the general aim is to provide seed money. Grants can be used in a catalytic way to access commercial investments from banks and impact investors (e.g. challenge funds).	Grants and subsidies are still largely needed in capacity building, resource assessment, information systems and monitoring. They are still critical in creating the enabling environment.
Microfinance schemes	Government, development agencies, NGOs	A plethora of microfinance institutions operate in developing countries. There are many democratic, member-driven, self-help savings-and-credit cooperatives as well as village community banks that offer grassroots lending schemes. These generally foster the ability of participants to innovate and manage viable income-generating activities by providing entrepreneurship training and other capacity-building initiatives. There are also commercial microfinance institutions.	Typically, microfinance schemes are not available for investments that have multiyear payback periods. They are more suitable for short-term production or other income generation. In forestry, they can be useful to purchase small equipment, cover costs that can be repaid within a short period, and help small producers build a credit track record.

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[27] A useful database of funding sources for forest-based value chains is the United Nations Forum on Forests' Clearing House on Forest Financing: https://forest-finance.un.org/

Instruments	Source	Description	Relevance to forest-based value chains
Short- to medium-term and commercial loans	Commercial banks	Commercial banks are interested in doing business if it makes financial sense or, in other words, if their expected return of credit covers the expected risks. Local banks in developing countries are seldom involved in forestry.	The nominal interest rates tend to be high, and payback periods short. Many local banks in developing countries perceive forestry as risky, because of illegal and unsustainable practices, among other reasons. The loans can be useful to purchase or repair equipment or vehicles, or finance short-term business needs.
Medium- to long-term and concessional loans	Local development banks	Local development banks have evolved recently and offer loans with subsidized interest rates and development criteria. They vary across countries but currently have few products for forestry.	Some local development banks have long-term debt instruments that could be accessed to make investments in forestry and downstream processing.
Long-term and concessional loans	International development banks	Several DFIs aim to finance the private forest sector in developing countries with concessional long-term loans (and also with other instruments such as mezzanine loans and equity – see below). For instance, the World Bank Group's International Finance Corporation offers investment, advisory and asset management services to encourage private sector development in developing countries. The Inter-American Development Bank (IDB) also has a division, IDB Invest, that focuses on the private sector. The European Investment Bank operates mainly in Europe but also has a significant stake in emerging economies. In addition to international development banks, a number of national development finance institutions, such as the Dutch FMO, German DEG, Finnish Finnfund and French PROPARCO, have invested in forestry companies.	The details of the conditions are confidential and negotiated on a case-by-case basis. Companies must be well established to receive DFI support. In addition, they must comply with international standards when it comes to financial as well as ESG reporting. Investments are large, in the order of USD 5–50 million, or even more. Development finance institutions require a company to contribute a significant amount of its own capital and often prefer other financing partners, like other DFIs.
Mezzanine loans	Development banks	As above. A mezzanine loan is a form of financing that blends debt and equity. Lenders provide subordinated loans (less senior than traditional loans), and they potentially receive equity interest as well. Mezzanine loans typically have relatively high interest rates and flexible repayment terms. Mezzanine debt typically has a lower priority than senior debt if borrowers go bankrupt. Depending on the conditions of the loan, lenders may be able to set conditions for business operations or receive a share in equity if the borrower goes into default.	Mezzanine loans are relevant in investment projects that have already been financed with DFI loans, and ensure the turnaround or continuation of operations.

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Instruments	Source	Description	Relevance to forest-based value chains
Green bonds	Government, institutional investors, companies (all entities buying the bonds)	Bonds are a form of debt, whereas stocks are a form of ownership. Bonds are also called fixed income securities. Investors in bonds become creditors of the issuing entity. Bonds can be issued by be private companies, supranational institutions (such as multilateral banks), and public entities (municipal, state or federal). A green bond is a debt security that is issued to raise capital to support climate-related environmental projects. Green bond investors are typically institutional investors (such as pension funds and insurance companies) or other investors with a strong environmental focus.	Large investment and forestry companies have issued green bonds to raise investment capital. The benefits for issuers include investor diversification, closer engagement with investors, raising awareness for an issuer's activities, and helping to build a market that helps mobilize private sector financing for climate-focused and environmentally friendly activities.
Junior and senior equity	International development banks	International development banks provide equity, which allows to share the risk with the target company or organization.	Equity investments have been made in large forestry companies.
Equity	Financial investors	Financial investors include pension funds, endowments and private equity. In many developing countries, the stake of financial investors has grown significantly. In the last 30 years, timberland investments have emerged as a new asset class (among stocks, private equity, real estate, bonds and securities). The most common investment vehicles for the institutions are timberland investment management organizations and real estate investment trusts.	The minimum investment size is large, and the receiver must have a strong commercial structure with a good track record. The institutions have mainly invested in assets in developed markets. However, investments in developing countries, mainly in Latin America, may already exceed USD 20 billion but still pale compared to the estimated total institutional timberland investable universe of USD 200 billion. The investment framework of financial investors and the critical factors influencing investment attractiveness are similar to those of large-scale foreign forest industry companies.
Equity	Impact investors	A growing number of impact investors pursue specific social and environmental objectives while seeking a financial return on their investments. They provide debt in addition to equity. So far, social impact investors are mainly from the United States of America and Europe and are mainly focused on social and environmental investments, such as education, health care and conservation. Recently, such investors have widened their scopes in both geographic and thematic terms. The investment criteria vary and are context specific.	Impact investors are already involved in many developing countries. The investors prefer large equity or loan sizes (like DFIs and financial investors), since otherwise the transaction costs are too high. Intermediaries, such as local banks or producer organizations, are used to disburse the funding at the local level.
Equity	Venture capital companies	Some "venture capital" companies resemble impact investors. They have holding companies that invest small-size equity in SMEs with a long time frame (without a defined exit period). Examples include Africa Eats and the planned Africa Trees, as well as the World Resources Institute's (WRI) Land Accelerator.	The small-size equity is appropriate for new SMEs (startups) that have good growth potential.

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Instruments	Source	Description	Relevance to forest-based value chains
Guarantees	Government, international organizations (e.g. European Union)	Underwriting funds to provide security (through risk pooling) for firms that are unable to obtain financing otherwise. In their most usual form, guarantees are associated with a loan or other financial obligation to be contracted by a borrower with a lender. They may be granted as individual guarantees or within a guarantee scheme (to increase lending to risky projects). They may take the form of guarantees on bank loans, microcredit or equity, and may involve a fee or higher interest rate for the borrower. As an unfunded product, a guarantee requires fewer initial resources than a funded product, such as a loan, which brings management costs down. However, a guarantee does not provide liquidity (it represents a risk reserve), its revolving effect is slow (money set aside cannot be reused until repayment is ensured), and the administrative complexity can be cumbersome. The European Fund for Sustainable Development Plus (EFSD+) under the European Union offers different instruments for DFIs and other funds to help them leverage additional sources of finance for development investments, for example, guarantees for government agencies (sovereign guarantees) and guarantees for private financing.	Guarantees can be provided by governments or DFIs to financial institutions to lower the credit risk of a particular loan product, for example through a first-loss guarantee. They can be applied for by funds of financial intermediaries that finance companies or producer organizations in developing countries considered risky.
Advance payments and other value chain finance instruments [i]	Supply and value chain finance	Many agro-industry companies finance farmers as part of their supply chains. They do this through outgrower schemes, offtake contracts, input supply finance, contract farming, warehouse receipt financing, insurance, guarantee funds and forward contracts. Such schemes are very location-specific, and some of them are common in the forest sector. The sources of funding for outgrower schemes may also come from development banks.	There are examples of forest-based outgrower schemes and offtake agreements in several countries, whereby small producers provide raw material to SMEs and larger companies in exchange for inputs, technical assistance and finance.
PES, including REDD+ results-based payments	Government, companies, philanthropic organizations	Payments for ecosystem services are incentives offered to farmers or landowners in exchange for managing their land in ways that enhance or protect the provision of ecosystem services. They can complement other revenue streams. They have been defined as "a transparent system for the additional provision of environmental services through conditional payments to voluntary providers". Currently, the largest PES transactions (which have also helped leverage significant private capital) are in carbon markets. REDD+ credits have proliferated, and the voluntary carbon market represents the largest volume of nature-based credits, making up 24.5 percent of credits issued. [ii]	Project-based REDD+ credits are traded both within the voluntary and the compliance market. They rely on several international certification standards established by carbon crediting programmes, such as Verra and Plan Vivo. Utilizing a results-based payments approach, most financial flows into REDD+ activities require a verified tradable carbon reduction unit in exchange for payments received, and financial flows are channelled to REDD+ via the voluntary carbon market, regulatory compliance carbon markets, bilateral and multilateral agreements, as well as philanthropic and "readiness" funds.

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Instruments	Source	Description	Relevance to forest-based value chains
Insurance	Private or public insurance companies	Forest insurance enables forest owners to protect forest assets (e.g. growing stock, seedling stands and felled timber) against natural hazards such as fire, wind, pests and diseases. In the context of increasing risks due to climate change, insurance is recommended as a vehicle to finance climate resilience and adaptation by several organizations and instruments, such as the World Economic Forum's Global Agenda Council on Climate Change, the OECD, and the UNFCCC (Article 4.8) and the Kyoto Protocol (Article 3.14). iii	Insurance is widely used by forest owners in developed countries. In the Global South, only large companies tend to afford appropriate insurance policies that protect them against natural hazards. Having insurance can lower the cost of credit.

Notes:

– A useful database of funding sources for forest-based value chains is the United Nations Forum on Forests' Clearing House on Forest Financing: https://forest-finance.un.org/

– SMEs: small and medium-sized enterprises; NWFPs: non-wood forest products; NGOs: non-governmental organizations; DFIs: development finance institutions; PES: payments for ecosystems services; REDD+: reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries; ESG: environmental, social and governance.

Sources:

Adapted from Boscolo, M., Lehtonen, P. & Pra, A. 2021. *Developing bankable business plans – A learning guide for forest producers and their organizations.* Forestry Working Paper No. 24. Rome, FAO. https://doi.org/10.4060/cb4520en

i FAO & AFRACA. 2021. *Agricultural value chain finance innovations and lessons.* Second edition. Rome, FAO and AFRACA. https://doi.org/10.4060/cb4776en

ii GEF. 2023. *Innovative Finance for Nature and People – Opportunities and Challenges for Biodiversity-Positive Carbon Credits and Nature Certificates.* https://www.thegef.org/sites/default/files/documents/202303/GEF_IIED_Innovative_Finance_Nature_People_2023_03_1.pdf

iii UNCCC. 2001. Issues – Art.4.8/4.9 & Art.3.14. In: *UNCCC COP7.* [Cited 9 January 2025]. https://unfccc.int/cop7/issues/art4849.html; World Economic Forum. 2014. *Climate Adaptation: Seizing the Challenge.* Global Agenda Council on Climate Change report. Geneva. https://www3.weforum.org/docs/GAC/2014/WEF_GAC_ClimateChange_AdaptationSeizingChallenge_Report_2014.pdf; OECD. 2023. *Enhancing the insurance sector's contribution to climate adaptation.* Business and Finance Policy Papers. Paris, OECD Publishing. https://doi.org/10.1787/0951dfcd-en

Development partners can consider different instruments to address different needs for value chain upgrading. Table 13 includes examples of different financing needs for different interventions.

TABLE 13

Examples of intervention areas mapped to financing needs and instruments for upgrading forest-based value chains

Intervention areas	Financing needs	Public financial instruments	Private financial instruments
Policy dialogue	Support for facilitation	Grants, budget support	
Law enforcement			
Land-use planning, land titling	Implementation, technical assistance		
Forest information systems	Forest resource assessments		
Fiscal reform Tax revenue collection and allocation Incentives, tax exempts	Support for facilitation, technical assistance	Grants, budget support	
Infrastructure development, connectivity, clean energy, information technology, digitalization, social services	Major investments in infrastructure	Loans, guarantees and grants	Sovereign loans
Conservation and restoration on government land	Operational costs (labour, materials)	Grants, budget support, guarantees for DFIs	Green bonds, sovereign loans Application of carbon markets in revenue models
Conservation and restoration on smallholder, community or company land	Compensation for alternative cost of land investment and operational costs (land, labour, materials)	Grants, budget support, guarantees for DFIs	Private sector financing: loans and equity Application of carbon markets in revenue models
Sustainable forest management for natural forests: community concessions	Investment and operational costs (labour, materials, technologies) for implementing management plan and logistics	Grants, guarantees for DFIs	Private sector financing: loans and equity channelled through intermediaries or companies
Sustainable forest management for natural forests: company concessions			DFI private sector financing: loans and equity
Smallholder plantations and agroforestry	Compensation for alternative cost of land Investment and operational costs (labour, materials, technologies)	Grants, guarantees for DFIs	Local bank loans (channelled from DFIs) Application of carbon markets in revenue models
Company plantations and outgrower schemes			Private sector financing: loans and equity
Harvesting systems and transport logistics	Investment and operational costs for harvesting and transport machinery		Local banks
Wood product processing – MSMEs Primary processing of solid wood products: sawnwood, panels Secondary processing: engineered timber, furniture Pulp and pulp-based products Energy products: sustainable charcoal, briquettes	Micro- and small enterprise: investments in upgraded technologies	Guarantees for DFIs	Private sector financing: loans and equity Local bank loans
	Medium and large enterprises: investments in new technologies and scaling		

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Intervention areas	Financing needs	Public financial instruments	Private financial instruments
NWFPs – MSMEs Collection, processing (e.g. shea butter)	Operational costs for collection systems, small investments in processing technologies and delivery systems	Grants, guarantees for DFIs	Local bank loans (channelled from DFIs)
Ecotourism – SMEs	Investments for facilities	Guarantees for DFIs	Private sector financing: loans and equity

Note:

DFIs: development finance institutions SMEs: small and medium-sized enterprises; MSMEs: micro-, small and medium-sized enterprises; NWFPs: non-wood forest products; NGOs: non-governmental organizations;; PES: payments for ecosystems services.

Source: Authors' own elaboration.

Key takeaway messages

- Financing for forest-based value chains in developing countries is limited and rarely reaches small-scale actors. The current level of financing for forest projects is insufficient to address major challenges like climate change, increasing demands and ending poverty.
- Public funds alone cannot bridge the gap. The involvement of the private sector is crucial. Carbon and biodiversity markets present an opportunity to improve the revenue streams in forest-based value chains. However, while promising, carbon and biodiversity markets are still uncertain, highlighting the need for a diversified funding approach.
- Governments need to create a business-friendly environment for sustainable forest-based businesses, particularly with measures that support smallholders and microenterprises.
- Smallholders, SMEs and marginalized groups (women, youth, Indigenous Peoples) struggle to access finance due to high transaction costs and perceived risks by lenders.
- Lack of collateral, weak organization and limited market access restrict investment and scalability, hindering eligibility for larger-scale financing.
- Financial institutions often lack understanding of forest businesses and offer unsuitable (short-term, high-interest) loan options.
- A funding gap exists for the "missing middle", those SMEs that are too large for microfinance but too small for commercial banks. This gap hinders commercial opportunities for smaller forest businesses, and overall scaling and upgrading of forest-based value chains.
- Upgrading forest value chains requires financing solutions that combine funding sources and instruments, like grants, loans and equity, from various players, such as governments, investors and development agencies. Limited financing solutions are currently available for forest-based actors. Value chain assessments can inform the development of financing solutions accessible to a broader set of value chain stakeholders.
- Financial innovation is key, with projects combining traditional product sales with new revenue streams like carbon credits, to improve project viability and attract investment.

A rendering of a modern sustainable wooden building with sleek architecture, vertical slats, and wide terraces, surrounded by greenery and natural light.

© Signal Tower | Le Havre Wood Up/ Atelier d'Architecture Marie Schweitzer

Glossary

GLOSSARY

Bioeconomy

"The bioeconomy is the production, utilization, conservation, and regeneration of biological resources, including related knowledge, science, technology and innovation, to provide sustainable solutions (information, products, processes and services) within and across all economic sectors and enable a transformation to a sustainable economy" (IACGB, 2020).

Circular economy

The circular economy refers to economic systems based on business models that reuse, recycle and recover materials (a concept also known as the three Rs of sustainability or the 3R approach) in production, distribution and consumption processes for achieving sustainable development. The concept can also be characterized as an approach that can reduce resource consumption by slowing, closing or narrowing natural resource loops. The cascading use of woody biomass is one of the strategies for such economic models.

Ecosystem services

Benefits provided by ecosystems to humans in the form of provisioning (e.g. food, water), regulating (e.g. climate, water purification), supporting (e.g. nutrient cycling, pollination) and cultural (e.g. recreation, spiritual) services.

Forest and landscape restoration

A planned process that aims to regain ecological integrity and enhance human well-being in deforested or degraded landscapes. This process does not seek to recreate past ecosystems given the uncertainty concerning the past, the significantly altered conditions of the present as well as anticipated but uncertain future changes. However, it does seek to restore a forested ecosystem that is self-sustaining and that provides benefits both to people and to biodiversity. For this reason, the landscape scale is particularly important because it provides the opportunity to balance ecological, social and economic priorities.

Forest ecosystem services

Forest ecosystem services are the ecosystem services derived from forests – they include the production of ecosystem goods such as food, water, timber and fibre; climate and water regulation; soil formation and conservation, photosynthesis and nutrient cycling; the generation and maintenance of biodiversity; pollination; pest control; seed dispersal; cultural values; and aesthetic beauty.

Forest governance

The formal and informal rules, organizations, and processes through which public and private actors negotiate and implement decisions regarding forest resources, and which are crucial for sustainable management and equitable distribution of benefits.

Formal rules

Regulations, policies and legal frameworks established by authorities governing forest resource use, benefit distribution and overall chain operation.

Horizontal linkages

Relationships among actors at the same level within the value chain, facilitating collaboration, partnership formation and competitive advantage.

Informal rules

Norms, traditions and unwritten codes of conduct shaping interactions and relationships within the forest value chain, impacting transaction costs, fairness and inclusivity.

Market power

The control and influence wielded by certain actors within the value chain, affecting benefit distribution, pricing structures and overall chain performance.

Positive externalities

Benefits enjoyed by individuals or society as a whole that are not reflected in market prices.

Public goods

Goods or services that are non-excludable and non-rivalrous, meaning individuals cannot be excluded from their use and one person's use does not diminish availability to others.

Resilience

The capacity of the value chain to withstand and recover from disruptions, including shocks, changes or stresses, while maintaining its essential functions and value generation capabilities.

Sustainability

Sustainability relates to the triple bottom line, requiring an analysis of economic, social and environmental impacts. Sustainability also relates to the value chain's resilience to shocks.

Sustainability assessment

An analysis of the economic, social and environmental impacts of the value chain to identify critical sustainability issues and guide improvement efforts.

Sustainable finance

Financial services that integrate environmental, social and governance (ESG) criteria into investment decision-making.

Trust

Reliability and consistency in interactions among stakeholders, fostering cooperation and problem solving, and reducing transaction costs within the value chain.

Value added

Value added is the difference between the revenue from goods sold and the total cost of goods and services purchased from other firms. (Financial) value added is computed as the difference between the value of a product and the costs of making it, and it consists of wages, profits, taxes, interest, depreciation and rent.

Value chain analysis

An analysis intended to collect and analyse all information needed to make strategic decisions for upgrading a value chain to increase its competitiveness and contribution to achieving the Sustainable Development Goals.

Value chain mapping

The value chain map is a flowchart that provides a general picture of the value chain from production to consumption, indicating the functions and actors, and the linkages between them, and the main channels. The main goal of value chain mapping is to present a picture of the current situation, facilitate an understanding of the structure, dynamics and dimensions of the value chain, and help identify possible leverage points.

Value chain governance

The decision-making and implementation processes governing the coordination, management and control of activities among different actors involved in the value chain, essential for optimizing operations, enhancing competitiveness and ensuring sustainability.

Value chain upgrading

Improvements in value chain efficiency, competitiveness, sustainability and inclusiveness based on the identification of systemic causes and the development of systems-based solutions. It also refers to shifting from lower-value economic activities to higher value ones using local innovation and enhanced capabilities to improve processes, products and functions. In some cases, upgrading may involve the use of new raw material sources (new producers are integrated in the value chain) and new technologies, the development of new products, or the access to new markets. The approach takes a systems perspective, analysing the behaviour and performance of value chain actors operating in a complex environment.

Vertical linkages

Relationships between different stages of production within the value chain, influencing resource allocation, production methods and efficiency, thereby impacting overall chain performance.

Appendix

APPENDIX
BRIEF OVERVIEW OF VALUE CHAIN ASSESSMENT TOOLS

Over the years, multiple value chain assessment tools have been produced. Below we provide an overview of the main ones.

A.1 Guiding principles on developing sustainable food value chains by FAO (2014)

The *Developing sustainable food value chains – Guiding principles* handbook, produced by FAO in 2014, offers practical guidance on sustainable food value chain development to policymakers, project designers and field practitioners. It emphasizes using a holistic approach to analyse and address the root causes of underperformance within value chains and outlines ten interrelated principles in a continuous development cycle. These principles address economic, social and environmental sustainability, ensuring equitable benefits and alignment with end-market opportunities.

The methodology to improve the performance of value chains is structured in three phases. Phase 1 on "Measuring performance" focuses on evaluating economic, social and environmental outcomes, and identifying value chains with the largest potential for improvement. Phase 2, "Understanding performance", delves into drivers of performance, stakeholder behaviours and value determination in end markets. Phase 3 on "Improving performance," involves developing a realistic vision and strategy, selecting upgrading activities, ensuring scalability and fostering multilateral collaboration.

The handbook acknowledges certain limitations, including the lack of a common understanding and consensus on value chain development, leading to challenges in coordination. Value chain development often prioritizes economic aspects over social and environmental impacts, potentially missing opportunities for sustainability. Additionally, the complex and time-consuming nature of value chain development necessitates careful planning and execution to achieve optimal results.

TABLE A.1

Overview of additional tools included in the handbook

TOOLS	
Title (type of file)	Objective
Gender in value chains – Practical toolkit to integrate a gender perspective in agricultural value chain development (PDF document)	This toolkit intends to motivate and help practitioners in integrating a gender perspective in agricultural value chain development, by providing practical tools for all stages of the value chain intervention. It is the second and adjusted version of an earlier Gender in Value Chain Toolkit published by Agri-ProFocus in September 2012. This version is adjusted based on experiences in using the first toolkit in Agri-ProFocus gender in value chain coaching tracks in Eastern Africa.
Developing gender-sensitive value chains (online course)	The development of sustainable food systems is a key component of the 2030 Agenda for Sustainable Development. This 2020 course discussed why eliminating gender inequalities is pivotal to achieving the necessary transformations. It proposes FAO's gender-sensitive value chain framework as an approach for the analysis of value chains, and for guiding interventions in order to address gender-based constraints.
Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis (PDF document)	This manual provides a set of tools that can be easily used and integrated in training programmes and courses devoted to value chain development. It considers an inclusive approach for integrating poor smallholders into value chain development, and the tools suggested also focus on its social aspects.
Youth sensitive value chain analysis and development (PDF document)	This publication is intended to assist field practitioners, youth organizations and other stakeholders in identifying binding constraints and viable opportunities for youth engagement in value chains, which can translate into greater youth inclusion. The youth-sensitive value chain analysis is a starting point for youth-inclusive agricultural value chain development, since it identifies entry points and key actions expected to bring about the desired increase in employment and business opportunities for youth within a more attractive agricultural sector.
Selecting value chains for sustainable food value chain development (PDF document)	This publication provides practical guidelines on how to select value chains for which upgrading is feasible and impactful in terms of the potential for generating positive economic, social and environmental outcomes. The handbook describes a step-by-step process that helps to assess, compare and select value chains in a participatory and evidence-based manner. It presents a toolbox that can be customized to projects with different budgets, scopes and objectives.
Transforming farmers' access to finance through digital agriculture (webinar recording)	On 12 April 2021, the FAO Technical Network on Sustainable Food Value Chains – Development and Finance (SFVC D&F) organized a webinar where experts from the Global System for Mobile technology Association (GSMA) explored the pivotal role of digital technologies in agricultural value chains, how digital agriculture solutions help facilitate financial inclusion for farmers, and the relevance of digital technologies to enabling farmers' access to credit and savings products.

A.2 FISH4ACP methodological brief on developing sustainable value chains for fish products by FAO (2021)

The *FISH4ACP: developing sustainable value chains for fish products* methodology brief, produced by FAO in 2021, is a significant publication for value chain assessment. It draws on various frameworks, including FAO's SFVC framework, the European Commission's Value Chain Analysis for Development (VCA4D) project and FAO's Value Chain Analysis Tool (VCA Tool). The FISH4ACP methodology provides a rigorous and standardized approach for value chain analysis and development in the capture fisheries and aquaculture subsectors. Notably, this methodology has undergone field testing in 12 African, Caribbean and Pacific (ACP) countries, enhancing its practicality and applicability.

The strengths of the FISH4ACP approach lie in its participatory and stakeholder-driven nature. It encourages engagement and collaboration through three multistakeholder workshops: the inception workshop, analysis validation and vision development workshop and value chain development plan workshop. By being comprehensive and inclusive, the methodology empowers stakeholders to actively participate in developing sustainable value chains for aquatic products. It relies on extensive secondary and primary data collection, ensuring a well-rounded and robust analysis.

The methodology is structured in two essential components: value chain analysis and value chain design. The value chain analysis includes a functional analysis and sustainability assessment, while the value chain design focuses on developing a vision and upgrading strategy, along with a comprehensive value chain development plan.

However, a limitation of the FISH4ACP methodology is its inadequate coverage of value chain financing aspects. While it excels in analysing functional components, evaluating sustainability and developing strategies, it lacks a dedicated focus on value chain financing. Incorporating a framework for value chain financing, including aspects like access to capital, investment strategies, risk management and financial sustainability, would enhance its effectiveness and support value chains with more robust financial structures and long-term viability.

TABLE A.2

Overview of additional tools included in FAO's FISH4ACP methodology

TOOLS	
Title (type of file)	**Objective**
FAO's VCA Tool (software)	The VCA Tool is a flexible software package that allows the value chain analysis team to systematically organize and integrate the collected physical quantity and financial data into a combination of products, activities, actors and aggregated levels. The software allows to clearly map the baseline scenario (current situation) at both market prices and reference prices from which all economic sustainability indicators are calculated. The tool also feeds into the development of an upgrading strategy for the value chain as it allows for an *ex ante* analysis of the socioeconomic effects of different upgrading options.
Value Chain Analysis for Policymaking – Methodological Guidelines for a Quantitative Approach. EASYPol Series 129 (PDF document)	This material is conceived for staff of ministries, policymakers, researchers and all those who have a role and interest in assessing the socioeconomic effects of policy measures for given value chain. It can be used for personal knowledge development, as a professional and operational reference, as well as a set of guidelines for ready-to-go group capacity development sessions. Some knowledge of economics is required for the user to fully benefit from the material. However, most of the content is also accessible to people without such a background.
Social Profile Tool (Excel spreadsheet)	The social sustainability analysis uses the Social Profile Tool, an Excel based spreadsheet inspired by the VCA4D approach. This tool involves expert scoring based on a combination of qualitative and quantitative data organized around a set of 72 questions and 25 quantitative indicators. As such, it is a strategic device to help highlight potential areas that need addressing through value chain upgrading.
Environmental Footprint Tool (Excel spreadsheet)	The environmental analysis uses an Excel-based tool that provides a framework for organizing the results of the analysis conducted, and has a sustainability scoring function that feeds directly into the development of the heat map. The tool helps experts in identifying the main areas of environmental concern that, if prioritized by the value chain stakeholders, could be tackled through the value chain upgrading strategy.

A.3 ValueLinks 2.0 manual on sustainable value chain development by Springer-Heinzer (2018)

ValueLinks 2.0 is a comprehensive and adaptable resource designed to support individuals involved in studying, planning and implementing value chain development activities. It offers a valuable toolkit for various sectors and organizations, including agriculture and manufacturing while accommodating various degrees of economic development and geographical regions. The value chain development instruments are generic in principle and apply to agricultural and natural resource-based, as well as non-agricultural products.

Unlike a rigid methodology, ValueLinks 2.0 is a collection of flexible tools that users can selectively apply based on their project's specific context. This approach allows for customization, ensuring that the unique demands and challenges of each value chain development initiative can be effectively addressed. Additionally, the resource connects users to relevant literature and knowledge sources, enhancing accessibility to further information.

The handbook comprises 11 modules aimed at facilitating the implementation of the value chain approach in sustainable development. Module 1 sets the foundation by defining the value chain system and integrating it into broader development agendas. Modules 2 to 4 focus on value chain analysis and strategy, exploring strategic options and involving core actors like private companies, government entities and international development agencies. Modules 5 to 10 are about value chain solutions and cover different elements of the value chain system individually, such as operators, linkages, services and rules. Each module highlights potential innovations and solutions within specific areas of change, such as improved business models, cooperative organizations, service arrangements and market regulation. These solutions are all integral to value chain development while representing distinct thematic areas that hold extensive bodies of knowledge. They present considerations and criteria to aid in choosing appropriate value chain solutions. The aim is to provide strategic guidance rather than offering a rigid blueprint or detailed prescriptions for stakeholders. Module 11 concludes the sequence by providing procedures and tools for quantifying ongoing change through information management, data collection, and analysis.

While ValueLinks 2.0 offers valuable insights and opportunities for economic and social progress, it also recognizes its limitations. It does not present a fixed recipe for sustainable economic development, as there are multiple approaches to achieving goals within the value chain development framework. Decision makers must consider the relevance of market-oriented development compared to other developmental approaches. Key considerations include evaluating how economic growth translates into social benefits and the inclusion of the poor, understanding the impact of market-focused strategies, and exploring alternative approaches, such as social policies, redistribution and direct public regulation of environmental and social matters. These fundamental questions of economic policy have no easy answers, but critically examining them is essential in determining the most appropriate approach for specific development programmes that aim to alleviate poverty and allow sustainable growth.

TABLE A.3

Overview of additional tools included in ValueLinks2.0

TOOLS	
Title	**Objective**
Guidelines for value chain selection – Integrating economic, environmental, social and institutional criteria (PDF document)	The Guidelines for value chain selection – Integrating economic, environmental, social and institutional criteria offer a holistic and structured approach to value chain selection. They combine four different dimensions of value chain and sustainable development: economic, environmental, social and institutional. Since the four dimensions are interconnected, overlooking any one of them during value chain selection will affect the next phase of value chain analysis and development. Because currently no comprehensive or systematic approach or methodology exists that combines these four dimensions, these guidelines have been developed to fill the gap. The guidelines include clear criteria and a set of tools to aid in the selection process. Potential users are development practitioners, governments and private sector initiatives, who wish to make well-informed decisions about which sectors and value chains to intervene in for market development.
Conflict-sensitive approaches to value chain development (PDF document)	This paper aims to provide initial thoughts and options for integrating conflict-sensitive approaches into value chain analysis and interventions in conflict situations. It uses a value chain framework as a starting point and explores how such approaches can be applied to the analysis of different levels and the various components of the chain. While the focus is on the initial analysis stage of a project cycle, the paper also presents preliminary points for practitioners to bear in mind in implementation
Value Chain Development for Decent Work – A systems approach to creating more and better jobs (PDF document)	This guide provides an overview of how to take a systems approach to value chain development with the objective of creating more and better jobs. Although several other manuals on value chain development already exist, the aim of this guide is to strengthen the focus on decent work. It is designed to be used by those involved in project development, implementation and evaluation. It can also be a useful resource for policy- and decision makers, as well as any implementing partners. Ultimately, the aim of this guide is to provide a set of principles, steps and tools that can be used and adapted by value chain projects in their particular context. It includes real-life examples and mini case studies. Each section is underpinned by theoretical concepts, but the focus is on their practical application.
FS SERIES #5: Value Chain Finance – Primer, diagnostic checklist, and model scope of work (PDF document)	The objective of this primer is to provide programme designers of the Government of the United States of America with a basic technical understanding of value chain finance and how to design approaches to it that will increase access to financial services in order to promote value chain competitiveness.

A.4 The Value Chain Analysis for Development (VCA4D) project

The European Commission's Directorate-General for International Partnerships (INTPA) has developed its interdisciplinary methodology for value chain analysis, thoughtfully combining and enhancing standard methods and specific tools. Since 2016, the Value Chain Analysis for Development (VCA4D) project has successfully conducted over 30 studies using this standardized methodology. In 2021, the methodology was updated to incorporate valuable lessons learned from the initial phases of implementation.

The primary purpose of value chain analysis is to furnish decision makers with evidence-based information pertaining to sustainable development strategies. This analysis is intended for all policymakers and stakeholders in alignment with the needs of the European Commission as an aid provider. The process involves generating evidence-based elements supported by quantifiable indicators or expert assessments, specifically addressing four framing questions on the value chain's contribution to economic growth, inclusivity, social sustainability and environmental sustainability.

The VCA4D analysis measures essential indicators, which, when appropriately assessed and contextualized through expert discernment, yield crucial insights into the impact and sustainability of a value chain. This approach facilitates the establishment of baselines and provides an accurate portrayal of the actors' current situation. The resulting depiction of the value chain aids in visualizing practical operations, projects and policies, and proves valuable in policy dialogues. Furthermore, over time, it enables the monitoring of how development actions contribute to achieving Sustainable Development Goals and align with the European Commission's and INTPA's strategic objectives. The analytical process consists of three essential stages: i) a functional analysis to understand the value chain's operations; ii) economic, social and environmental analyses to address the framing questions; and iii) synthesis of information to derive meaningful insights and recommendations.

A.5 ACIAR guide to value chain analysis and development for overseas development assistance projects by Collins, Dent and Bonney

The manual's design caters to a diverse range of users, addressing the needs of various individuals involved in value chain projects and development initiatives. The primary target audience includes:

- value chain project developers and managers;
- researchers, trainers and extensions officers involved in projects, and undergraduate and postgraduate researchers who want to understand the principles and practice of value chain thinking and analysis;
- value chain members and any other project participants; and
- stakeholders in development projects that incorporate value chain analysis, such as in-government policymaking and service delivery agencies, and collaborating NGOs.

The essence of this manual lies in promoting "value chain thinking", a comprehensive approach that encompasses the entire value chain, with a strong emphasis on understanding markets and consumers, as well as fostering collaboration among all chain members. By adopting this holistic perspective, the manual highlights the significance of effectively aligning skills, resources and behaviours among partners to deliver products and services that resonate with consumers, minimize waste and generate equitable financial returns, thereby sustaining the collaborative partnerships.

At the core of this interactive research and training manual is the translation of value chain theory into practical research methodologies. By bringing theory and practice closer together, the manual bridges the gap between academic insights and real-world application, enhancing the effectiveness of research efforts. Furthermore, it incorporates the valuable experiences and lessons from practitioners, integrating their knowledge back into the theoretical framework. This dynamic learning cycle continuously refines research practices, making them more relevant, practical and impactful.

This manual consists of four parts.

Part 1 provides an introduction to value chains and so is useful for everyone, with two versions available. The theoretical explanation version will appeal to those who are interested in the underlying theories and principles, which are described using technical terminology. The non-technical version uses everyday language without the depth of theoretical explanation, and may appeal to readers with a mainly practical interest in the topic.

Part 2 provides a detailed explanation of how to undertake value chain projects for research, development and extension, and will be useful for anyone involved in the detailed implementation of projects or who are planning projects as part of funding applications or postgraduate studies.

Part 3 offers some practical lessons from the field and gives details of case studies of value chain thinking in action. It is intended that Part 3 will be supplemented by further examples submitted by other researchers. In illustrating the ideas in the manual with practical examples, this section could be interesting for any reader.

Part 4 provides training in value chain thinking, and so will be useful to members of project teams who are responsible for delivering such activities to value chain members. Some exercises, such as walking the chain, are also useful as training for researchers.

Uganda - Tree plantation

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Honduras - Timber yard.

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Kenya - Plantation of *Melia volkensii* trees. This indigenous species is planted for the production of high quality timber.

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Enhancing the sustainability and financing of forest-based value chains

For more information, please contact:

Forestry Division - Natural Resources and Sustainable Production

NFO-Publications@fao.org

www.fao.org/forestry/en/

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